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UNION OF SOUTH AFRICA.

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# DEPARTMENT OF AGRICULTURE

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## REPORT

WITH

## APPENDICES

FOR THE YEAR

1st APRIL, 1913, TO 31st MARCH, 1914.

(EXCLUDING AGRICULTURAL EDUCATION.)

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Presented to both Houses of Parliament.

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Price: 7s. 6d.

CAPE TOWN:  
CAPE TIMES LIMITED, GOVERNMENT PRINTERS.  
1915.

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Do. do. (Dutch)	...	...	...	...	5	3
First Aid to the Injured, Armstrong, 1895	...	...	...	...	1	...

JUN 4 - 1915

UNION OF SOUTH AFRICA.

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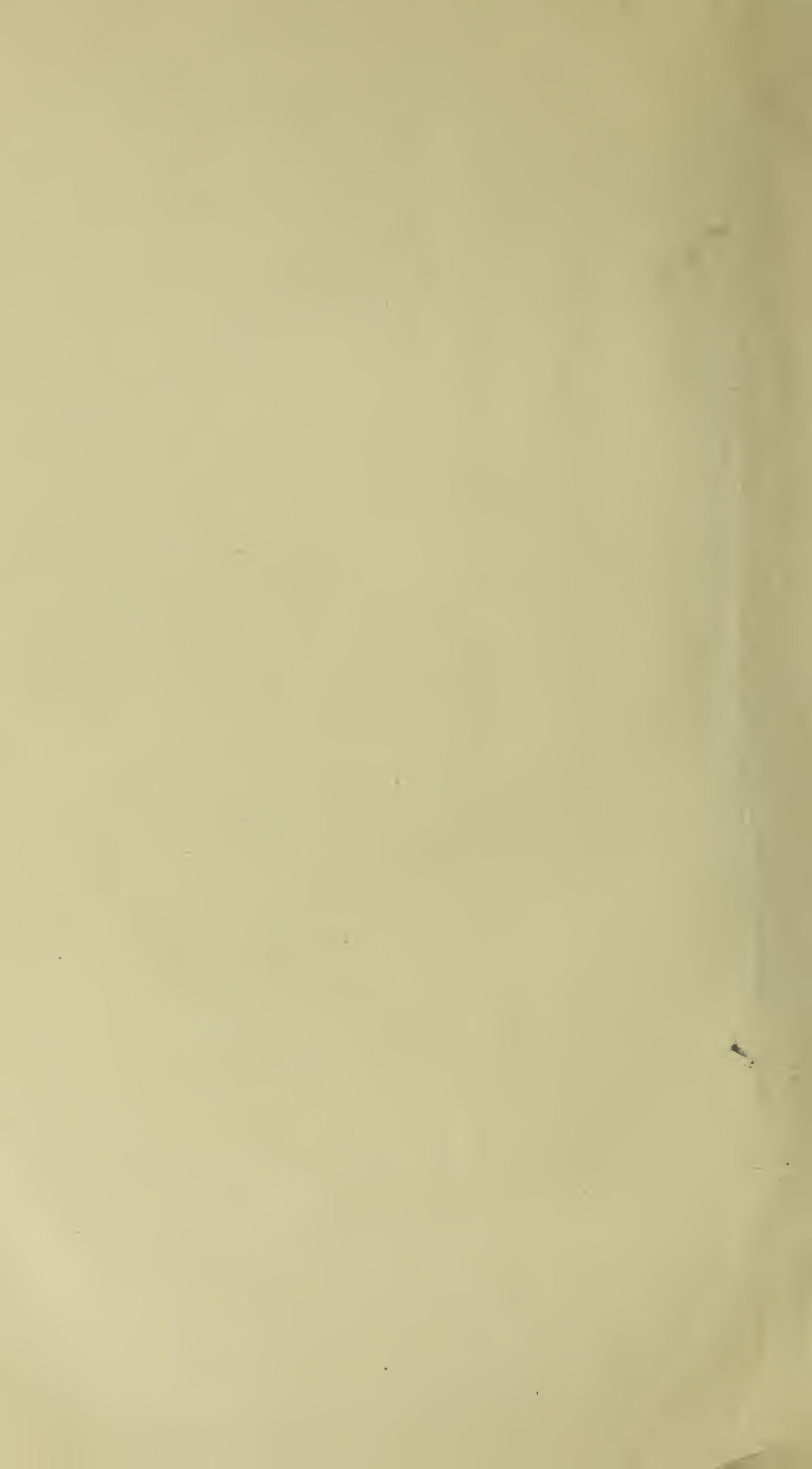
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Presented to both Houses of Parliament.

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CAPE TOWN :

CAPE TIMES LIMITED, GOVERNMENT PRINTERS.  
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D. CUTBERT

21 May 1914

# DEPARTMENT OF AGRICULTURE.

REPORT FOR THE YEAR 1ST APRIL 1913, TO 31st MARCH, 1914.

(Excluding Agricultural Education.)

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5 JUL 1914  
1913/14  
D. CUTBERT



# UNION OF SOUTH AFRICA.

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## ANNUAL REPORT of the Department of Agriculture for the Period 1913-1914, with Appendices.

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Presented to both Houses of Parliament by Command of His Excellency the  
Governor-General.

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Department of Agriculture,  
Pretoria.

### ANNUAL REPORT, 1913-14.

The Honourable the Minister of Agriculture.

Sir,

I have the honour to present my report on the work of the Department of Agriculture for the year ending 31st March, 1914, together with reports for the same period from the Heads of the various Divisions.

Agricultural Education, which is provided for in a separate Vote, is dealt with in another report.

Comparatively few changes were made in the Department during the year, and those that were made were in the direction of strengthening some of the Divisions, and of effecting certain economies in the Administrative and Clerical work of the Department rendered possible by the gradual clearing up of the vast amount of Clerical work caused by the amalgamation of the four Colonial Departments of Agriculture, and by the consolidation and simplification of legislation dealing with diseases of live stock and plants, fencing, dipping tanks and other important agricultural matters.

As occasion offered various matters not directly relating to Agriculture or of doubtful expediency that have been dealt with by one or other of the Colonial Departments of Agriculture before Union have been transferred to other Departments to whom they more properly belonged, or have been discontinued, and with the exception of the Field Cornets in the Transvaal who will shortly be handed over to the Department of Justice, and the manufacture of lymph for vaccination against small-pox, which will be undertaken by the Department of the Interior, the operations of the Department are now confined to its legitimate functions, and it appears that with the exception of a few minor adjustments that may yet be necessary, the re-organisation of the Department is practically completed.

But though this may be so, it must not be supposed that a lasting settlement has been arrived at, with the exception possibly of the framework of the Department, for with a Department concerned with an industry like Agriculture, in which fresh developments and problems are constantly occurring, there can be no finality, and changes of one sort or another to meet the altered conditions must be expected from time to time. Further, this is a new and comparatively unexploited country, and if the industry expands as we hope and believe it will, an increase in certain branches of the Department will also be necessary to deal with it.

#### STAFF.

Since my last report the following changes have taken place on the Staff of the Department. Three officers, I regret to say, died, forty-six resigned, twelve retired on account of age, and twelve were dismissed.

The resignations included Mr. Burt-Davy, Chief of the Division of Botany; Doctor Macdonald, the Editor of the Journal; Mr. A. Davison, Principal Sheep Inspector and late Chief Inspector of Sheep in Cape Colony; Messrs. Shilston and Hall, Veterinary Bacteriologists; and Veterinary Surgeons Elphick and Doyle, and Dairy Inspectors Carruthers and Zahn.

The appointments included a Physiological Chemist for the Veterinary Research Division, two Assistant Chemists, three Assistant Veterinary Bacteriologists, one Veterinary Surgeon, one Entomologist, two Assistant Entomologists, one Assistant Botanist, two Assistant Sheep and Wool Experts, two Tobacco Experts, two Dairy Inspectors and one Dairy Instructor.

At the present time the Staff consists of 153 Administrative and Clerical Officers, 107 Professional and Technical Officers, 722 Field Officers, Inspectors and Guards, 134 Miscellaneous Officers and 462 Native Labourers and Constables.

During the year several officers took long leave, the majority of them going abroad for the sake of the change and in order to see what was being done elsewhere in their particular lines of work. It is very necessary for professional and technical officers to keep fresh and up-to-date, and the employment of their leave for this purpose is greatly to their credit, and a thing to be encouraged as much as possible.

Doctor (now Sir Arnold) Theiler, who was absent for a year, occupied his time in studying Veterinary Bacteriology and Pathology in laboratories in Europe, and Messrs. McNab, Mallinson and McKee in studying the Sheep and Wool industry in England and Australia.

In view of the probable export of butter before long, Mr. Challis, the Superintendent of Dairying, was sent to Australia and New Zealand to obtain the latest information upon dairying in those countries.

Whenever possible the Heads of Divisions have attended Agricultural Congresses and other important gatherings of farmers, at which subjects with which they were concerned were discussed, in order to get into touch with the farmers and to ascertain their needs and the best methods of assisting them.

The difficulty of procuring good men to fill the scientific and administrative posts in the Department, which has been commented on before, continues. Men of moderate attainments are plentiful and easy to obtain, but good men are more in request than ever. It also appears as if men who are really worth having, and therefore usually in a position to choose, prefer to work in Universities and other learned institutions which are independent or semi-independent of Government control, or engage in business on their own account, rather than in Government Departments, as in the former they have more scope and freedom of action and have not to waste time by furnishing multitudes of returns and continually explaining and demonstrating the necessity for their existence.

Seeing that the value of the Department to the country depends in the first instance entirely upon the quality of its professional and administrative officers, this is a very serious matter.

Efforts are being made to overcome the difficulty of obtaining professional and technical officers by giving scholarships to likely young men to study at institutions abroad, at which they can get the best training obtainable in their particular subjects. The course of study is usually a four years' one, and a number of scholars have already returned and been drafted into the Department. This is undoubtedly one of the best methods of obtaining officers for the Department, but at the same time it should be recognised that it may not entirely suffice, and that from time to time officers will have to be appointed from wherever they are obtainable, as at present.

There is an impression abroad that since Union the professional and technical staff of the Department has been reduced, and that officers are unduly concentrated in Pretoria, but this is not so, for as a matter of fact the expert staff has been increased since Union and there are more officers now in the field than ever before, and there are fewer officers in Pretoria now than there were in the Capitals of the various Colonies previous to Union.

The only officers stationed in Pretoria are those concerned with Administration, such as the Secretary and Under Secretary, and Heads of Divisions, whose presence here is necessary in order to ensure uniformity of action throughout the country and to focus matters for the attention of the Minister, together with the necessary accountants and clerks, and officers engaged in certain lines of Scientific Research which can most profitably be undertaken at or from Headquarters, and the number could not be reduced without the work of the country suffering and without great delays in connection with correspondence and other matters that can only be dealt with at Headquarters.

By far the greater portion of the staff of Vote 32, Agriculture, and with the exception of the Under Secretary and his personal clerks, the whole of Vote 33, Agricultural Education, which has also been considerably increased since Union, are distributed throughout the country, so as to be as closely in touch with their



work and with the farmers as possible, and to avoid waste of time in travelling and overlapping of work.

The impression referred to may have arisen through the officers of the Department now being more evenly distributed throughout the country and therefore not so conspicuous as when collected to a greater extent at the Capitals of the various Colonies, and to their being chiefly engaged in dealing with diseases of live stock, itinerant instruction and other work which does not lend itself readily to advertisement. The fact of Experts—particularly Veterinary Surgeons—being much more appreciated than they were a few years ago, and our staff of Veterinary Surgeons and Itinerant Experts and Instructors being altogether too small to meet the demands upon it, would also encourage the impression referred to, as farmers who cannot obtain the services of Experts as promptly as they would wish are apt to attribute the delay to over-centralisation.

An account of the organisation of the Department, together with a list of the chief officers in the various divisions and their locations is included in the Appendices.

### HOUSING.

Towards the end of 1913 the whole of the Department located in Pretoria, with the exception of four Divisions, was moved into the Union Buildings.

Hitherto the Department has been housed in buildings scattered all over the town, and the housing of the greater portion of it under one roof and in close proximity to the other Departments of State will vastly facilitate its work and be a great convenience to members of the public who, as often happens, have business to transact with more than one Division or with other Departments as well as this. Further, the magnificent and salubrious site selected for the buildings, and the character of the buildings themselves, and of their surroundings, cannot fail to exercise a beneficial effect upon the minds and bodies of the officers working in them, and to increase their efficiency.

It would have been still better if the whole of the Department, with the exception of the Division of Veterinary Research, could have been housed with the rest of the Department, but owing to lack of space and to difficulties about the laboratories and facilities for out-door experiments which are essential to the work of some of the Divisions, this could not be managed.

In 1909 a sum of £80,000 was voted by the Transvaal Parliament for the erection of a building for the Transvaal Department, which it was proposed to erect on an open site in the town, but whilst the site and plans were being discussed Union was suddenly and unexpectedly decided upon, and in view of the buildings being required for the Union Department of Agriculture instead of the Transvaal Department, it was decided to erect it on a site close to the one selected for the Union Buildings. Plans were prepared by the Architect of these buildings for the laboratory portion of the Agricultural Building on the understanding that the administrative and clerical staff of the Department were to be accommodated in the Union Buildings until such time as the space occupied by them was required by the other Departments when the Department's building was to be completed, by the erection of an office block, and as a matter of fact, when the rooms in the Union Buildings were assigned to the different Departments, the allotment to this Department was made with this contingency in view. Most unfortunately for reasons that need not be discussed now, this was postponed, but it is sincerely hoped that before long it will be proceeded with.

Another thing which would benefit the Department enormously would be the exchange of the portion of the town lands extending from the grounds of the Union Buildings and including the area known as Prinshof, to the Zoological Gardens for the farm Groenkloof, previously given by the Municipality of Pretoria to the Government as a site for an Agricultural College. Groenkloof is too far from the Union Buildings to be of much service to the Department or to admit of much communication between the Department and the College of Agriculture should one be established on it, and as a matter of fact, though it is a very fine estate, it is not altogether an ideal site for an Agricultural College, whereas though the ground in question is much smaller—only about 200 morgen or 420 acres in extent—there is more cultivable land on it, and it is admirably adapted for experimental purposes and for an Agricultural College. It immediately adjoins the site reserved for the Agricultural building and it is on the way from the Union Buildings and the town to the Veterinary Research Station at Onderstepoort.

If the suggestion were given effect to, the whole of the activities of the Department in Pretoria would be brought together as closely as possible, the

Department would be within a stone's throw of the other Government Departments in Union Buildings, and the College of Agriculture, instead of being isolated on Groenkloof, would be within an easy walk of the Department and as near to the Laboratories at Onderstepoort, with which it would have much in common, as it could be. The Divisions of the Department which are concerned with research like Chemistry, Botany, Entomology, Horticulture, Tobacco and Cotton would have excellent facilities for conducting experiments and demonstrations and other outdoor work close to the doors of their offices and laboratories, and they would be in close touch with the Agricultural College. There can be no doubt that the scheme suggested would greatly increase the efficiency of the Agricultural work of the Government and make for economy and also be very convenient for farmers and others visiting Pretoria, whose time is usually limited and who now frequently leave the town without seeing or knowing half of what is going on in the Department. The town would benefit by receiving back the beautiful and fertile Fountains Valley, the natural park and picnic ground of Pretoria, and the portion of the farm Groenkloof not reserved for forestry purposes, which is very valuable for building sites and other purposes, and the possibility of any friction or complication arising in connection with the water supply of Pretoria by the occupation of the farm by the College would be avoided. Further, the attractions and amenities of the town would be vastly increased by the occupation of the ground by the Department. Pains are being taken in the laying out of the grounds around the Union Buildings to get together as extensive a collection of native and other trees and plants as possible, and when completed, what is to all intents and purposes an arboretum and botanic garden will be established there, and if the ground under discussion were laid out as an Experiment Station with collections of fruit trees, grass gardens and other economic plants, the town would be encircled on the North from Government House to the Zoological Gardens by a succession of drives and grounds of exceptional interest and beauty. Therefore, respectfully and earnestly I beg to urge that the transfer of the land referred to, which it is understood is now forming the subject of negotiation between the Government and the Town Council of Pretoria, be effected, and that a building be erected for the use of the Department at the earliest opportunity. If this were done there would be few, if any Departments of Agriculture in the world better equipped for the work they have to do than this, and we should have the satisfaction of feeling that we had availed ourselves of a unique opportunity, and according to our lights had done the best that could be done both for the present generation and for those who will succeed us. In any case it is most desirable that the ground should be obtained, as it would be exceedingly useful for the experimental work of the Department, and sooner or later, as the larger schemes develop, it would be invaluable for them. At present the land is vacant, but it may not continue so for long, and if the present opportunity of obtaining it is missed it may never recur again.

In the event of it not being possible to proceed with the Department's buildings at present, it is imperative that laboratories should be erected without delay in the neighbourhood of the site reserved for the Department Building for the Division of Chemistry which is at present housed in an old wood and iron building situated in the centre of the town which is utterly unsuitable for the use of the Division. The Division of Plant Pathology is housed in quarters close to Union Buildings, and which will serve for some time to come, but it will be a great help if sufficient additional rooms could also be added to it to accommodate the old Division of Botany which is now housed in a private dwelling house some distance away, and if some greenhouses and infective houses that are greatly needed were erected.

The Division of Entomology also occupies a private dwelling house standing some distance from the Union Buildings. The arrangement was the best that could be made at the time, but it is not ideal. If quarters could be built for it in the neighbourhood of the Botanical Laboratory it would be a great help.

#### ACCOUNTS.

The immense amount of accounting work caused by the clearing up of what may be termed extraordinary matters dealt with by the various Colonial Departments of Agriculture before Union, such as steam ploughing and the sale and leasing of live stock to farmers in Natal, fencing in the Transvaal and Natal, loans to Co-operative Societies in the Cape and Orange River Colony; though not yet quite completed is rapidly being disposed of.

Grants-in-Aid to Agricultural Societies which also involved a great deal of labour have been straightened out and placed on a uniform basis throughout the Union, and the administration of the Grants-in-Aid in the Cape and Transvaal Provinces by their Provincial Councils, and the granting of loans to farmers for fencing and dipping tanks by the Land Bank instead of by this Department as formerly, have considerably relieved our Accounts Branch.

The accounts are now up to date and in good order. Owing to re-organisation being practically completed and to the experience that has been gained of the circumstances and requirements of the Union, it should be possible to estimate the expenditure of the Department more accurately in the future than it has been in the past.

The expenditure and receipts of the various Divisions of the Department for the last year and the year before, together with an explanation of any considerable increase or decrease in expenditure or revenue are given below, the slight increases in the expenditure of several of the Divisions are due to increases in the staff.

VOTE 6.—AGRICULTURE.

Division.	Year ended 31st March, 1913.		Year ended 31st March, 1914.	
	Expenditure.	Revenue.	Expenditure.	Revenue.
	£	£	£	£
Administration .. ..	30,404	—	29,893	—
Grants-in-Aid .. ..	31,213	—	24,922	—
Veterinary .. ..	113,183	4,442	109,389	2,935
Sheep .. ..	104,934	—	129,044	796
Veterinary Research .. ..	54,331	7,225	50,540	12,518
Dairy Industry .. ..	4,535	—	5,315	5
Botanical Plant Pathology .. ..	6,422	—	7,431	57
Tobacco and Cotton .. ..	11,184	1,292	12,317	1,458
Horticulture .. ..	4,124	265	3,876	596
Viticulture .. ..	4,037	2,138	3,759	2,000
Entomology .. ..	11,769	5,024	13,478	5,097
Chemistry .. ..	1,138	—	1,558	30
Publications .. ..	5,280	—	4,373	—
Co-operation .. ..	4,936	—	3,309	—
Brands and Fencing .. ..	11,246	10,792	2,420	27,618
Dry-Land Farming .. ..	3,848	—	4,055	238
Guano Islands .. ..	25,508	35,343	33,544	47,538
Cold Stores .. ..	4,557	2,257	765	1,039
Field Cornets .. ..	24,444	—	24,632	—
Grain Inspection .. ..	3,516	1,919	2,139	626
Ostrich Industry .. ..	5,384	—	—	—
Steam Ploughs, Natal .. ..	2,707	3,583	259	4,790
Miscellaneous .. ..	—	21,399	—	12,131
	£468,700	£95,679	£467,018	£119,472

*Grants-in-Aid.*—Decrease due to grants to Societies in Cape Province being made by the Provincial Councils and various outstanding claims being finally adjusted in previous year.

*Veterinary Division.*—Decrease in expenditure due to diminution of East Coast fever; decrease in receipts due to reduction in number of cattle inoculated against East Coast fever in the Transkei.

*Sheep Division.*—The increased expenditure was due to increases in the staff and transport, and the cost of simultaneous dipping of sheep; the revenue is derived from the sale of dipping material for the depôts in the North-West of Cape Province.

*Veterinary Research.*—Decrease is due to restriction of work owing to the absence of Sir A. Theiler, increase in receipts due to greater demand for vaccines and sera.



*Tobacco and Cotton.*—Receipts due to sales of tobacco, etc., from Experimental Stations.

*Entomology.* The increased expenditure was due to an increase in the staff and to unforeseen expenditure on locust destruction; the revenue is mainly derived from fees charged for the inspection of plants and potatoes.

*Brands and Fencing.*—The decrease in expenditure was due to the closing down of the Division, and the increase in revenue was caused by the sale of the fencing material on hand.

*Guano Islands.*—The increase in expenditure and in receipts was due to the large crop of Guano and to the 1913 season being very late, and the 1914 season early.

*Cold Stores.*—These were closed down during the year.

*Grain Inspection.*—The decrease in expenditure and revenue were due to diminished export.

*Ostrich Industry.*—The expenditure in 1913 was on account of the expedition to Nigeria, which ceased with the arrival of the birds at Grootfontein.

*Steam Ploughs, Natal.* The ploughs have all been sold, but money owing for them and for ploughing performed is still being collected in instalments.

*Miscellaneous.*—The receipts under this head consist chiefly of money collected on account of loans and sales by the late Colonial Departments gradually being repaid.

The gross expenditure last year was almost the same as that of the year before, but owing to an increase in the receipts—mainly for the sale of guano and fencing material—the net cost was less, being £347,546, as against £373,021 the previous year. Since Union the expenditure on non-essential and extraneous services has been considerably reduced, and as readjustments are completed and arrears of work are finally disposed of, which they should be by next year, it may be possible to make a few more small savings in certain directions, but on the whole it appears that we are now getting down to bed-rock, and that with the exception of that on East Coast fever, which is diminishing, and it is hoped scab later on, the expenditure could not be further reduced without sacrificing or postponing work of importance to the country. Nor is it easy to see how the allocation of the funds at our disposal could be much improved upon: they are fully utilised as it is, and it would be impossible to devote more money to any particular object or Division without interfering with the work of one or more of the other Divisions. On the other hand, more assistance is greatly needed in many directions and a vast amount of work which would be very helpful to the country is quite untouched or very inadequately provided for.

It is estimated that the investigation and control of diseases of stock and plants cost about £273,391 per annum or roughly 80 per cent. of the total expenditure of the Department: the expenditure on East Coast fever and Scab is particularly annoying, and it is sad to think that in a country like this where there is so much to be done, and money is so scarce, that these two diseases which, if every farmer did his duty, could be completely eradicated in a very short time, should cost the country directly in hard cash some £200,000 per annum, and indirectly many times that amount.

#### VETERINARY DIVISION.

No outbreaks of contagious disease new to the country were reported during the year, though contagious abortion which has been suspected for some time was confirmed by the newly-discovered method of diagnosis, and with the exception of Tuberculosis and Anthrax amongst cattle, steady progress was made in dealing with the contagious diseases already present. The outbreaks of Foot and Mouth Disease in England, and Rinderpest in German East Africa, which were referred to in my last report, occasioned some anxiety on account of the possibility of those diseases reaching this country through stock imported from England or by spreading southwards from German East Africa.

Lungsickness, Glanders, Epizootic Lymphangitis, Mange in equines, and Swine Fever, which in years gone by cost the country dear, have been reduced to very small dimensions indeed, and it is probable that on the whole the Union has never been so free from contagious diseases of live stock or so well protected against them as at present.

East Coast Fever has continued to occupy the lion's share of the energies and funds of the Division, and full particulars of it and of the other diseases will be found in the report of the Principal Veterinary Surgeon. In the Transvaal it has nearly been eradicated except in Piet Retief. In Natal the position is im-



proving, though the disease is still widely distributed; hitherto the great obstacle to the eradication of the disease in that Province has been the Native Locations and leased farms. The Native Affairs Department are now busily engaged in constructing tanks in the locations and in supervising the dipping of cattle, and the Law has been amended so as to give us power to compel non-resident owners of land upon which cattle are kept to fence it and erect a dipping tank thereon, which formerly we were unable to do, and it is anticipated that the exercise of those powers when necessary will have a salutary effect, as there is little doubt the disease was often kept alive by cattle belonging to natives running on otherwise unoccupied farms.

The difficulties of dealing with the disease in the Native areas in the Transkei are immense owing to the ignorance of the natives respecting it, the absence of fencing, and the cost of constructing dipping tanks, but even there an improvement is manifest though it may be due in part to the disease having burned itself out in certain districts as well as to the measures taken to combat it.

The Magistrates, aided by the portion of the Veterinary Staff which has been located in the Transkei, and the Native Council, are striving earnestly to cope with the disease, and there is reason to hope that it will gradually be overcome. The inoculation of cattle, which was largely resorted to in the first instance, is now being contracted. But though the situation is infinitely better than it was and the outlook is encouraging it must not be forgotten that as long as sources of infection remain there is a risk of the disease spreading, and it behoves farmers living near infected areas to exercise every precaution till it is entirely stamped out, and it is to the interests of the farmers to fence their farms and systematically dip their cattle both as a safeguard against this and other diseases and for other reasons.

As regards Tuberculosis amongst cattle the efforts of the Department have been confined to dealing with such outbreaks of the disease as have come to the notice of the Division, and to maintaining the quarantined area in the South-West of the Cape Province, and testing imported cattle, and the position still remains unsatisfactory.

It is highly desirable that steps should be taken to ascertain the extent of the disease, as the Principal Veterinary Surgeon thinks there may yet be time to conduct a campaign against it at a moderate cost and with reasonable hope of success.

If the country could be cleared of the disease and kept free from it, it would be a great boon, though it must be confessed the experience gained on our various Stud and Experimental Farms where the disease has been fought since their establishment 10 years or more ago at an enormous expense and has not yet been completely cleared out of any of them, is not very encouraging.

The compensation for animals slaughtered on account of the diseases, except perhaps in the case of animals visibly diseased, should be increased from the present rate of one-fourth of their value to two-thirds of the value. If this were done a source of great hardship to farmers who are unfortunate enough to have the disease amongst their cattle and have attention directed to it would be removed, and suspicious cases would be more readily reported, and it is quite possible that the disease might be kept in check if not diminished without any further amendment of the policy now pursued.

Gal Lamziekte does not appear to have been any worse in the North-West, but it seems to have been more prevalent in the South-West of the Cape Province, and cases have been reported from Natal and other parts of the Union.

A severe outbreak of horse-sickness occurred in Humansdorp and some of the surrounding districts, but elsewhere the disease was not particularly prevalent.

Enquiries are being conducted into an alleged fly disease in Zululand, and into a disease known locally as White Liver in sheep in the Orange Free State.

There is a growing demand for Veterinary Surgeons, which is a pleasing testimonial to the value of the services rendered by the officers of the Division, and proves one of many illustrations that could be given of the great change that is taking place in the ideas and circumstances of the farmers, many of whom, a short time ago, regarded Veterinary Surgeons with disdain if not aversion.

Our present staff is barely sufficient to deal with contagious diseases alone, and in view of the increase in the value and numbers of live stock it is highly desirable that more Veterinary Surgeons should be available for treating non-contagious ailments of stock. This could be arranged either by increasing the staff of the Division and charging fees for the services rendered other than in connection with contagious diseases, or by giving subsidies to private Veterinary Surgeons who would be prepared to practise in various parts of the country.

## DIVISION OF SHEEP.

The campaign against Scab has been vigorously pursued during the year, though it was considerably handicapped by the drought. From the figures given by the Chief of the Division in his report it will be seen there has been a decrease in the percentage of infected flocks and of infected animals and in the percentage of infected sheep arriving at the Johannesburg abattoirs.

No alterations have been made in the organisation of the Scab Branch of the Division, but there have been considerable changes in the personnel: Mr. A. C. Davison, late Principal Inspector of Sheep, three Senior Inspectors and five Inspectors retired on account of age. The thanks of the Department are due to these gentlemen, and to Mr. Davison in particular, for the services they rendered in grappling with Scab in times of exceptional difficulty. Seventeen Sheep Inspectors and one Field Cornet resigned, and eleven Inspectors were dismissed.

During the year forty-one Inspectors were appointed; their qualifications were carefully considered and every effort was made to obtain competent men. Steps are being taken to instruct the Inspectors in the classing of sheep and the sorting of wool as well as in the eradication of Scab, in the hope that they will be induced to take an interest in the improvement of sheep and wool generally and by doing so become more efficient Inspectors and more useful and acceptable to the farmers.

The Annual Conference of Senior Sheep Inspectors was held in Cape Town; some extremely interesting and pertinent discussions took place, and it is evident these Conferences are very useful in keeping the Department and the Inspectors in touch with one another and in educating and stimulating them and in bringing about uniformity of action throughout the country.

Some notable investigations into the parasites causing Scab and the effects of various dips upon them were undertaken by Mr. Shilston, at the Allerton Veterinary Research Station. Unfortunately, Mr. Shilston left the Department before the experiments were completed, but Sir A. Theiler is continuing the work at Onderstepoort and checking the conclusions already arrived at. The experiments have proved that in this country the life cycle of the Scab insect is completed in from  $8\frac{1}{2}$  to 9 days, instead of in from 12 to 14 days, as was commonly supposed. This discovery helps to explain why twice dipping has frequently not been successful in cleansing sheep from Scab, and will be of material assistance in dealing with the disease.

There has been a great deal of discussion upon the use of lime and sulphur and soda and sulphur as dips, on account of the damage they are said to do to the wool. When in England, Senior Sheep and Wool Expert Mallinson, who is well acquainted with the woollen manufacturers at Bradford, made careful enquiries into the matter, from which he gathered no harm results from the dips in question provided they are properly prepared and used, and seeing that lime and sulphur have been in common use in the country for many years and that it and soda and sulphur are the best dips at present known for destroying Scab, which is our primary object, and also that they are cheap and safe, they will be recommended until a better dip is discovered or more convincing arguments are advanced against their use.

The ideal dip would be one effective against Scab and also ticks and lice, portable and easy to prepare or mix with water, and cheap, and experiments are being conducted with a view to ascertaining how far the dips now in use fulfil these requirements and whether they can be improved upon.

The erection of dipping tanks has been greatly facilitated by the Dipping Tanks Further Provisions Act, 1913, which fills a gap in the original Act and enables us to compel non-resident owners of farms on which sheep and goats are kept, to erect tanks. During the year close upon 3,000 tanks were erected, and it is estimated there are 32,226 tanks in the Union at present.

In the course of the year 1,894 persons were convicted of contravening the Regulations, and fines to the value of £6,542 6s. were imposed. Unfortunately, the simultaneous dipping of sheep, from which much had been hoped, was not a success, for the reasons given by Mr. Enslin on page 76 of his report, and it has been decided to discontinue it.

In view of the results of Mr. Shilston's experiments and the knowledge gained by more extended experience and closer study of the Scab problem, it is evident the Regulations can be amended with advantage, and a revised edition of them will shortly be published. The chief alterations will be the reduction of the period between the first and second dipping from ten to fourteen days to from eight to ten days. Inspectors will be empowered to undertake the cleansing of



infected sheep at once when deemed necessary, instead of having to wait for from thirty to sixty days as at present. Provision will be made for declaring districts or parts of districts clean areas and to compel all sheep to be dipped on the border of such areas before entering them and *vice versa* for allowing no sheep to be moved from areas in which Scab is particularly prevalent without being dipped.

The total expenditure of the Division amounted to £129,044, of which £118,000 was spent upon Scab—a very large sum indeed, though not so large as the aggregate expenditure of the four Colonies on this disease prior to Union.

It may be asked is such a large outlay justified? Is there any prospect of its being reduced or of Scab ultimately being eradicated?

The reply is that the sheep industry is of such vast and increasing importance to the country that the expenditure, heavy as it is, would be warranted if only to secure the advantages already gained, and to afford the protection already afforded, for though it is quite possible the administration of the Scab Law in the past may not have been perfect and money may have been wasted, yet a vast amount of good work has been accomplished, and it is certain that if the measures now being taken to combat the disease were withheld, the country would be in a far worse state than it is to-day.

As a matter of fact, it appears that not only has the disease been arrested, but it is being overcome; the figures quoted from Mr. Enslin's report show there was a decrease in the amount of Scab last year, and there are good reasons for believing that from now onward substantial progress will be made in the campaign against it and that the returns from the money spent upon the disease will be much greater in the future than they have been in the past.

Our knowledge of the disease and of the method of controlling it is much greater than it was, and Union has rendered it possible to deal with it more effectively and economically than previously and with less inconvenience to the public. The personnel of the Division has been improved and the organisation is good, and owing to the pains that have been taken to educate the Inspectors and to interest them in the work and to keep them up to the mark, the force engaged in dealing with Scab is far more efficient than it was. Further, thanks to the Diseases of Stock and Dipping Tanks Acts it is much better armed.

There are also other agencies at work besides those furnished by the Department which cannot fail to operate powerfully in the fight against Scab. A much keener interest is being taken in the quality and welfare of sheep than formerly, and the management of sheep, though in many cases it still leaves much to be desired, is improving, and there is a large and growing body of farmers who are doing their best to keep their own flocks clean, and are impatient of Scab amongst those of their neighbours; further, the erection of fencing, which is proceeding apace, and the measures which are being taken to render the farmer self-supporting, and so obviate the need for trekking, are all of great assistance in controlling the disease.

The complete eradication of Scab will, it is feared, be a long job, because of the size of the country and the numerous small flocks of sheep—mainly non-woolled—and goats, belonging to poor white farmers, *bijwoners* and natives scattered over it, but it should be possible to stamp it out in the more progressive sheep districts in a comparatively short time, and to prevent them from re-infection. As an illustration of the difficulty of freeing a country of Scab it may be mentioned that the disease still lingers in Great Britain, and there are few countries entirely rid of it. In Australia the disease was stamped out, to the great credit of all concerned, but under conditions different from those obtaining here, for the sheep were all woolled sheep in the possession of white farmers, and for the most part in large flocks on fenced farms.

Good services have been rendered by the Sheep and Wool Section of the Division, which has been strengthened by the addition of Messrs. Schuurman and Roberts, students from Transvaal, who completed a four years' course of study in Australia with great credit.

The experts have been busily engaged in giving lectures and demonstrations on the classing and mating of sheep, classing of wool, and on the management of sheep generally: they have judged at Shows, and whenever their duties permitted have made personal visits to farmers in their areas. In the course of the year some 350,000 sheep were classed by the experts, and a very large number of farmers were personally instructed in the preparation of their wool for market.

It is estimated that at the close of 1913 there were in the Union 28,327,907 woolled sheep, 7,480,093 non-woolled sheep, 4,194,884 Angora goats and 7,211,142 other goats, against 27,331,167 woolled sheep, 8,557,754 non-woolled sheep, 4,395,101 Angora goats and 7,296,061 other goats in 1912.

The decrease is mainly attributable to the drought, which was responsible for the death of 840,600 animals; 1,447,000 animals were lost from disease. The proportion of woolled sheep to non-woolled sheep is increasing, which is a good sign, but the reduction in the number of Angora goats is regrettable. 176,971,865 lbs. of wool, valued at £5,719,288, and 17,355,882 lbs. of mohair, valued at £876,255 were exported during the year, against 161,974,684 lbs. of wool, valued at £4,780,594, and 23,479,728 lbs. of mohair, valued at £967,286, the year before. South African greasy wool made from 6d. to 13d. in London, whilst Australian greasy wool realised from 7½d. to 17½d. per lb., though in justice to the South African wool it should be stated that the difference in price of scoured wool from the two countries was not nearly so great and that the chief reason why our wool fetches less per lb. than the Australian is that it contains more dust, which is largely, though not entirely, attributable to the nature of the veld. Mohair realised from 6d. per lb. to 2s. per lb. at the port.

Good progress has been made by sheep farmers of late years, and the industry is in a very different position now to what it was a few years ago, but there is still great scope for improvement. Although a high standard has been attained by the best individual sheep and the best flocks, the general run of sheep are not nearly so good as they ought to be, and there is also need for better management. If the best is to be made of the sheep, jackals and other vermin must be destroyed or excluded by fencing, the farms must be paddocked so that they can be grazed systematically, and drinking water must be provided in each paddock and also shelter belts. If this be done, the necessity for herding the sheep by day and kraaling them at night, a practice that fills the wool with dust and causes the sheep to lose condition through having to walk to and from the kraal every night and morning instead of being allowed to roam freely and to feed and rest as they feel disposed, will be avoided, and likewise the injury done to the veld by continual and unnecessary tramping. Care must be taken not to overstock, and food must be provided to supplement the veld in winter and in time of drought, trekking must be reduced to a minimum, the sheep must be kept free from Scab, and the losses from other diseases, which are now enormous, must be reduced; lastly, more care must be taken in the preparation of the wool for market. It is not expected that all the sheep will be raised to the level of stud animals, or that losses from disease and drought will be obviated altogether, or that trekking will be completely stopped, but it is evident that by the exercise of a little more thought and labour on the part of the farmers, and the assistance on the part of the Government in educating them and helping them to overcome disease, the returns from sheep farming can be greatly increased.

#### DIVISION OF VETERINARY RESEARCH

An immense amount of work of the greatest value to the country was performed by this Division during the year, and Sir Arnold Theiler's report should be studied by everybody in any way concerned with live stock.

In September, Doctor Theiler, who had been granted a year's leave for study and refreshment in Europe, returned to duty, and in January he was created a K.C.M.G. The honour done by His Majesty the King to the most distinguished member of the Department was highly appreciated by his colleagues in the Department, and will, I am sure, be equally gratifying to all who are acquainted with him personally or his work.

Mr. A. W. Shilston and Mr. G. N. Hall, Research Officers, resigned to take up posts in India and British East Africa respectively. Mr. Hall had been in the Department for a short time, but Mr. Shilston had been in charge of the Veterinary Research Station in Natal for some years, where he was doing excellent work, and will be difficult to replace. The reason for Mr. Shilston's departure was the refusal of the Public Service Commission to grant him an increase of £50 per annum, in order to place him on the same footing as certain other officers in the Division. Had the request, which was strongly supported by the Department, and was ultimately granted by the Commission, been agreed to in the first instance, Mr. Shilston would probably not have left, and the loss and inconvenience caused by his departure would have been avoided.

Mr. H. H. Green was appointed Biological Chemist, and Messrs. E. M. Robinson and J. de Kock, Research Assistants. Owing to the representations made in Parliament special efforts were made to secure experts for the investigation of gal lamziekte, and ultimately the services of Professor Hedinger, of Basle, were secured for six months to enquire into the disease and make suggestions for further investigations.



During the year £5,600 was expended in additions and alterations to the Laboratories at Onderstepoort. The Sub-Stations at Allerton, near Pietermaritzburg, in Natal, and at Grahamstown in the Cape Province, and the Gal Lanziëkte Field Station at Vryburg, were maintained as usual throughout the year. The expenditure for the Division amounted to £50,025, and the receipts to £13,771.

Investigations were conducted into tuberculosis in pigs, contagious abortion in cattle, chick fever in ostriches, pernicious anæmia in horses, galziëkte in sheep, redwater and pen-sickness in suspected cattle, wire worm in ostriches, scab parasites, dun sickness in horses, heartwater, poisonous plants, lamziëkte, and other subjects.

Valuable, and in some cases striking information was obtained from each line of research, full particulars of which will be found in the Report of the Division.

As Mr. Stead, the newly-appointed Chemist at Grootfontein School of Agriculture, had propounded a theory of the cause of gal lanziëkte which appeared to be worth testing, arrangements were made for him to do so at Grootfontein, but though some very interesting results were obtained, the cause of the disease was not determined.

As usual the examination of blood smears and pathological specimens, and the replying to enquiries from farmers and others on veterinary matters, and the despatch of serum and vaccines occupied a good deal of time.

During the year 11,154 smears and specimens were examined at the Laboratories at Onderstepoort, Allerton and Grahamstown, and 21,801 letters and telegrams were received by the three Institutions and 26,217 despatched, and the following preparations were sent out:—

Blue Tongue Vaccine .. .. .	971,390 doses.
Black Quarter .. .. .	197,450 „
Redwater and Gall-sickness Serum .. ..	15,860 „
Mallein .. .. .	5,811 „
Horse Sickness Serum for Mules .. ..	1,374 „
Anti-venene .. .. .	224 „
Vaccine Lymph .. .. .	430,050 „
Total .. .. .	1,622,159 „

In addition to the above, 108,106 doses of anthrax vaccine and 13,830 doses of tuberculin were imported from France and England respectively, and issued to the public.

During the blue tongue season of 1912-13 complaints were received of the vaccine failing to confer immunity; from the enquiries that were made it seemed likely that in some instances inoculation had failed to protect against natural infection, though in proportion to the amount of vaccine used that season—657,948 doses—they were very limited.

The inoculation of cattle against redwater and gall-sickness is still attended with a certain amount of risk and uncertainty, and efforts are being made to render it safer and more reliable.

The inoculation of mules against horse-sickness remains satisfactory, but the inoculation of horses against horse-sickness has not yet been placed on a satisfactory basis, though there is good reason to believe that most desirable end will soon be accomplished; the immunity conveyed by inoculation appears to be satisfactory, but the mortality from the operation is too high. It will be remembered that when the inoculation of horses was first attempted the operation was frequently complicated by the presence of biliary fever; it now appears that another and until recently unsuspected disease—pernicious anæmia or swamp fever—is also present in the country, and it is probable that the high mortality observed after inoculation in certain cases has been caused by the infection of horses with the disease through the use of serum obtained from horses suffering from it. Attention is now being directed to the elimination of this factor, and it is hoped that when it is accomplished inoculation for horse-sickness will be again undertaken. The preparation of vaccines, sera and diagnostic agents is now attaining such large dimensions that the desirability of making separate provision for it in order to avoid the possibility of research being interfered with has been mooted, but I think such a course would not be advisable at

present. It is possible that the business and also the educational side of the work of the Division may to a certain extent interfere with research, and the tendency for it to do so must be guarded against, but on the other hand the combination has many advantages. As will be gathered from Sir A. Theiler's report, our knowledge of several of the diseases is still incomplete and some of the sera and vaccines are likewise capable of improvement, and by being closely in touch with the public through correspondence on diseases and so forth and by observing the effect of the sera and vaccines sent out upon the animals and on the diseases against which they are employed, information may be acquired that may lead to a better understanding of the diseases and of how to combat them.

In order to relieve the Division of routine and extraneous work as much as possible the preparation of vaccine lymph, anti-venene and rabies vaccine is being transferred to Public Health, who have kindly consented to take it over.

#### DIVISION OF DAIRYING.

The staff of this Division was strengthened by the appointment of a Senior Inspector in the person of Mr. C. C. Hardy.

Mr. Challis, Chief of the Division, visited Australia and New Zealand in order to study the methods of dairying in vogue in these centres and to enquire into the assistance rendered by the State to the Dairy Industry, and the export of butter and cheese.

Several changes took place in the staff during the year. As far as the Division is concerned this is to be regretted, but on the other hand the country will benefit, as the whole of the officers have taken up positions in creameries in the Union, and as the positions in the Division have been filled the number of expert dairymen in the country has been increased.

Despite the drought which greatly handicapped the farmers and checked the production of milk, dairying is slowly but surely forging ahead in the Union. Thanks to the introduction of dipping, which constitutes the greatest advance ever made in cattle farming in this country, and to the example set by progressive farmers who are to be found distributed over the country, and to the efforts of the Division, farmers are beginning to realise that dairy farming is an art, and that in order to produce milk properly the cows must be selected and bred with a view to the production of a good quantity of rich milk, and that they must be properly treated.

Milking trials are being conducted at the leading shows, and cow testing associations, which are perhaps one of the best methods of interesting the farmers in the yield of their cows, and of raising the quality of dairy stock are being discussed and established and a scheme of grants-in-aid to the same has been prepared by the Department. Concurrently with the improvement in the production of milk, the Creameries are also advancing, and most of them are turning out good butter. The chief difficulty connected with them, as with many other enterprises in the country, is the high cost of working, and every effort should be made to reduce this, otherwise we shall be considerably handicapped when competing in the markets of the world with butter from other countries.

It is estimated that 10,741,745 lbs. of butter were produced in the Union last year, which was an increase of 302,745 lbs. over the year before; 520,849 lbs. of cheese were made.

3,893,036 lbs. of butter and 5,586,244 lbs. of cheese were imported last year, against 4,925,188 lbs. and 5,165,715 lbs. respectively the previous year.

The imports of condensed milk were valued at £449,653.

#### VRYPBURG COLD STORES.

On account of the cost of running these stores and of the limited use made of them by farmers, it was decided to adopt the recommendation of the Public Accounts Committee and dispose of them, and ultimately the Railway Department, who depend upon the stores for ice for their trains in that part of the country, and who are in a position to run the stores much more economically than the Department could hope to do, agreed to take them over.

The expenditure on the stores for the year was £815 7s. 9d., and the receipts £800 11s. 1d.

## DIVISION OF BOTANY.

Mr. J. Burt Davy, the Chief of the Division of Botany, resigned during the year in order to engage in the breeding of farm seeds on his own account.

Mr. Burt Davy was in charge of the Division of Botany in the Transvaal Department from its formation till Union, after which he acted in a similar capacity for the Union.

During the time he was in the Government Service Mr. Burt Davy performed an immense amount of most valuable, scientific and educational work, and the services he rendered to the country, particularly in connection with the popularisation of Teff grass, and the assistance and impetus he gave to mealie growing, will always be regarded as landmarks in the history of South African agriculture.

After the resignation of Mr. Burt Davy, the Divisions of Botany, Plant Pathology and Mycology were united and placed under Mr. Pole Evans.

The work performed by the two Divisions is closely related, and their amalgamation should make for economy without any sacrifice of efficiency.

The Division of Plant Pathology is housed in suitable quarters close to Union Buildings, but it is greatly in need of green houses and infection houses. The Division of Botany remains in the private dwelling house, to which it was transferred some time ago, which, though the best that could be done at the time, is not well adapted to its needs, and is some distance from the other laboratory. Accommodation could be provided for it by a slight extension to the Pathological Laboratories, and if this were done considerable savings would be effected and the usefulness of the Divisions materially increased.

In future the resources of what used to be the Division of Botany will be more closely confined to such administrative work as must be done at Headquarters, and to scientific investigation, which cannot well be performed elsewhere, whilst the testing of varieties of plants and crops on an extended scale, the popularising of the results of scientific research, co-operative experiments and extension lectures will be conducted by the Schools of Agriculture, which, owing to their situation and to their large farms and other facilities, can discharge these functions more effectively and economically than a Division located in Pretoria.

The Experimental Station at Groenkloof is being continued, but it is a considerable distance from the laboratories, and it would be a great convenience if sufficient ground for the use of the Division could be obtained nearer to it; a large area is not required, but a small portion for conducting experiments under conditions such as would obtain in the field is absolutely necessary.

During the year Mr. Mogg, B.A. (Cambridge) was appointed to the Botanical Section, and Miss Bottomley, B.A. (Cape) to the Pathological Section. The work of the Division, which was chiefly concerned with diseases of plants, is clearly set forth in Mr. Pole Evans' Report.

A Bill for regulating the sale of agricultural seeds was prepared, but unfortunately, owing to pressure of other business, it was not introduced into Parliament.

## DIVISION OF TOBACCO AND COTTON.

The Division has been strengthened by the addition of Messrs. Koch and Oosthuizen, who were granted Scholarships by the Transvaal Department for the study of tobacco and cotton at Agricultural Colleges in the Southern States of the United States of America.

A hostel for the accommodation of twelve students is nearly completed at the Rustenburg Experimental Station.

The Experimental Station at Barberton, which had been in existence for nine years, was closed down, and Mr. Wilson, the Officer-in-Charge, who is a specialist in cigar tobacco, was transferred to Natal, where the manufacture of cheroots is a promising industry.

An Experimental Station for Turkish tobacco has been established at Elsenburg, under the supervision of Mr. Stella. Hitherto the tobacco work in the Western Province has been confined to co-operative experiments and demonstrations on private farms, which have served a most useful purpose, but which did not completely meet our requirements, as there are many points connected with the growth and curing of Turkish tobacco yet to be settled, which can only be satisfactorily investigated at a permanent station, and as provision was also required for the instruction of the students at Elsenburg



in tobacco farming, it was decided to found a small station there, which will form the headquarters of the tobacco work in the Western Province.

The selection and sale of reliable tobacco and cotton seed to farmers has been continued, and has done much to prevent disappointment in germination and to promote uniformity of crop and trueness to type. The Division has been very largely consulted by tobacco farmers and is much looked up to and relied upon by them, and it has also done much to promote the growth of cotton. In order to obtain the fullest and latest information on the growth and handling of Turkish tobacco it is proposed to send Mr. Stella to Asia Minor next year to enquire into these subjects on the spot. The tobacco crop in the Transvaal last year was of poor quality owing to the drought; light cigarette tobacco was in demand as usual, but the poorer qualities of cigarette and pipe tobacco were a drug in the market, and it is evident the production of these descriptions of tobacco is greater than the consumption. The co-operative warehouse at Rustenburg alone handled some 4,000,000 lbs. of tobacco.

The Turkish tobacco crop in the Western Province was likewise not good and the demand for it was also disappointing, indeed at one period it was almost unsaleable, though at the time of writing the trade has somewhat improved.

Amongst the reasons advanced by the farmer for the collapse were the cigarette tax, the importation of cigarettes from abroad, the pushing of imported cigarettes to the detriment of the local article, and an attempt on the part of the manufacturers to reduce the price, whilst the manufacturers attributed the shrinkage in the demand to the large stock they had accumulated and to much of the tobacco being of inferior quality, and not well sorted or properly fermented, also to the varieties of tobacco grown being insufficient to enable satisfactory blends to be made without the use of imported tobacco.

The matter is being carefully enquired into by the Department, as the sudden collapse of the market has inflicted great hardship on farmers who had grown tobacco in the expectation of being able to sell it for much the same prices as those obtained last year, and it is evident that what bids fair to be a valuable industry is in danger.

A co-operative warehouse for the sorting, fermentation and sale of Turkish tobacco has recently been formed at Paarl, and the proper fermentation of tobacco in it should remove one of the obstacles to the sale of that class of tobacco. It is to be hoped the visit of Mr. Stella to Turkey will also be productive of good. Meanwhile it is thought that if farmers exercise care in the growth and curing of the tobacco, and its production is kept within reasonable limits, it will still remain profitable.

The imports of unmanufactured tobacco into the Union last year from oversea were valued at £50,358, and of manufactured tobacco exclusive of cigars and cigarettes and snuff at £5,887, and of cigarettes at £84,656, and of all kinds of tobacco from Rhodesia at £53,478, whilst the exports of tobacco oversea amounted to £15,579, and to Rhodesia £65,517. The exports from Rhodesia oversea amounted to £3,797.

The existing duty on unmanufactured tobacco is 3s. per lb. and on manufactured tobacco 4s., and on cigarettes 4s. 6d. per lb. plus an *ad valorem* duty of 15 per cent., which varies from 9d. to 3s. per lb., bringing the total duty up from 5s. to 7s. 6d. per lb. There are roughly 500 cigarettes to the lb.

It would seem therefore that the production of tobacco has practically equalled the demand. It is true the imports may still be reduced somewhat, but probably not to any great extent, as there will always be a demand for certain kinds of cigarettes and tobacco which cannot be produced here, and unless an oversea market can be found for it there will be little scope for any extension of the industry. Enquiries are being made by the Rustenburg Warehouse and other interested parties of the prospect of markets abroad, and it is to be hoped that such may be found, though if they are it is not likely the prices will equal the prices growers have been accustomed to obtain here.

Meanwhile the best advice that can be given to growers is to discontinue the growth of inferior tobacco which is unremunerative, and only tends to depress the market, and to do their best to meet the requirements of the trade here, and if possible produce tobacco fit for export.

#### COTTON.

It is expected that some 500,000 lbs. of seed cotton will be produced in the Rustenburg District this season, and an up-to-date ginning plant has been erected by the Co-operative Society at a cost of £2,125.



The experiments conducted by the Division at the Rustenburg Experimental Station during the last few years have proved the suitability of the district for cotton, and the information furnished by the station, combined with the low price of tobacco and the dry seasons, have induced farmers to turn their attention to cotton.

Cotton has been experimented with in South Africa for many years, but this is the largest trial that has yet been made of it, and should it prove successful, as it promises to do, there is every likelihood of the industry becoming firmly established in that District. The reports from the other experimental Stations and from the trials conducted by farmers are also favourable.

If the growth of cotton were to be assured it would be an excellent thing for the country, as it would be the means of increasing the area of land under cultivation and putting to good use much land now lying idle, or from which very little is obtained, and it would also afford profitable employment for many people. Moreover, by providing an alternative to tobacco in the up-country districts it would help to prevent the over-production of that crop. Experiments have shown that we can produce in South Africa cotton of better quality than the corresponding varieties from the United States of America, and as cotton is a product that is always in demand there can be no fear of over-production or of difficulty in obtaining a market for it. Further, the seed would provide oil and a valuable nitrogenous food for cattle, both of which are greatly needed in this country.

#### HORTICULTURE.

The Horticultural Station at Ermelo has been discontinued; the Station served a most useful purpose in stimulating the growth of apples in the High Veld, but it suffered greatly from hail, and it was thought that the money spent upon it could now be more usefully employed in other directions.

The Officer formerly in charge of the Station has been transferred to the South-Eastern portion of Cape Province, where great developments in fruit growing are in progress.

A Horticulturist has been appointed to the Grootfontein Agricultural College, and efforts are being made to make the Horticultural Stations at the Agricultural Colleges as efficient as possible. The Chief of the Division keeps in close touch with the Horticulturists at the Colleges, and thanks to the pains and tact displayed by him the work of the Division and of the Agricultural Colleges and Experimental Stations is being co-ordinated and is proceeding smoothly and harmoniously.

During the year the usual Conferences with exporters of fruit have been held at various centres, and a Bill providing for the compulsory inspection of fruit prior to export has been drafted.

An increasing interest is being taken in fruit growing, and the industry is rapidly expanding; the export of deciduous fruit last year was by far the largest that has yet taken place, amounting to 6,460 tons, against 4,096 tons in 1912, the previous highest record, and the area under that class of fruit in the Western Province of Cape Province is increasing.

The export of citrus fruit was valued at £13,747, against £7,667 the year before.

Large numbers of Washington Navel and the better varieties of oranges are being planted and undoubtedly there is a great future before this branch of the fruit industry, as South African citrus fruits are unsurpassed in quality.

The growth and export of pines is making considerable progress and shows great promise in certain portions of the South-East of Cape Province and Natal, where the conditions are very favourable for their growth.

The cultivation of apples—most useful and desirable of all fruits—is extending. There are also several other kinds of fruit likely to come into prominence before long.

The fruit drying industry is also advancing.

Unfortunately, with the exception of deciduous and citrus fruits, which have made substantial advances, the amount of fruit growing here is one of promise rather than of performance, as last year, according to the Customs returns, the total value of fruit exported only amounted to £54,503, whilst the imports of fresh, dried and preserved fruit of various kinds (including nuts) amounted to £174,418, and of jams and jellies to £40,824.

## DIVISION OF VITICULTURE.

The work of the Division has proceeded as usual. The Oenological Institute is in course of erection at Elsenburg, and when completed will provide the much-needed laboratory accommodation, and greatly facilitate the work of the Division. The Viticultural Station at Paarl, which was previously the headquarters of the Division, is being continued as a Sub-Experiment Station and worked from Elsenburg; the outlay on it is small, and on account of the number and variety of vines established there its retention is amply justified.

The equipping of the station at Elsenburg is being proceeded with, and efforts are being made to render the collection of vines at Paarl, which is already extensive, as complete as possible. The investigation into the behaviour of the various stocks on which vines have been grafted has been continued.

The Viticulturist states that the vintage was a large one, but owing to the cool damp weather disease was prevalent, and the sugar content of the grapes was below the average, and a good deal of inferior wine was made. During 1913 wine was firm in price, starting at about £5 per leaguer and going up to £10 during the latter half of the year, probably owing to the Excise legislation; during February and March young wine of 1914 vintage made from £4 10s. to £5 per leaguer, but the price soon fell to £3 per leaguer, from which it has recovered somewhat.

It is estimated that during the year 1,000,000 vines have been planted, and if extension continues at this rate there is bound to be an over-production of wine unless a market can be found for it overseas. The Viticulturist suggests that more attention be given to the export of table grapes and the making of raisins, which would be profitable and tend to prevent the over-production of wine; he also thinks that if brandy of the proper type were made it could be exported at remunerative prices.

## GOVERNMENT WINE FARM, GROOT CONSTANTIA.

This farm has been maintained on the same lines as heretofore. Wine making was carried out under favourable conditions and the results obtained were satisfactory. The vintage amounted to 15,688 gallons or 152 gallons per acre of vines, as against 13,739 gallons or 133 gallons per acre last year.

The fruit grown during the season was exported, as it was thought that the Government should not compete with growers on the local market, and that it should set an example in the packing and exporting of fruit. Unfortunately, the prices realised were poor, for the fruit generally was not of the best quality owing to the soil not being very suitable for fruit growing and the inferiority of many of the trees. Instructions have been given for the growth on unsuitable soil to be discontinued and for the inferior varieties to be grafted or replaced.

The receipts for the financial year amounted to £1,932 8s. 11d. and the expenditure to £2,304 11s. 1d. The total cost of working the farm and wine-making for the year, including supervision, amounted to £11 18s. 0d. per acre of wine and fruit land and the cost of labour to £4 15s. 0d.

During the year four students were received at the farm.

On account of representations made by neighbouring farmers of the scarcity of labour, convicts from Tokai were employed as much as possible so as to avoid competition with the farmers.

## DIVISION OF ENTOMOLOGY.

During the year the staff of the Division was increased by the return to duty of an officer who had been to the United States for the prosecution of advanced study, and of an Assistant Entomologist; another officer, who has also been studying in England and the United States, is expected back shortly. Entomologists have been appointed at several of the Schools of Agriculture, who it is hoped will relieve the Division of a good deal of local investigation and advisory work.

The Division is represented by technical officers in all four Provinces and by Plant Inspectors at the four principal ports and at Johannesburg. A Senior Entomologist, Mr. C. W. Mally, is stationed at Cape Town, and during the year he, aided by an Assistant Entomologist, Mr. C. P. van der Merwe, and a Field Assistant, has made good progress in the study of several specific pests. Another Senior Entomologist, Mr. C. B. Hardenburg, is stationed at New Hanover, Natal, and he, with a technical assistant, has confined his



attention strictly to an investigation of the bagworm and other insects injurious to wattle trees. The representative in the Orange Free State is Mr. J. C. Faure, who is stationed at Bloemfontein. It is planned that the latter devote most of his time to specific investigations, but up to the present he has been kept busy with general matters. The Chief Entomologist, Mr. C. P. Lounsbury, and the Assistant Chief, Mr. C. Fuller, and an Assistant Entomologist, Mr. D. Gunn, are located at Pretoria.

Nursery inspection forms an important feature of the work of the Division and the conditions of the nurseries of the Union with respect to pests that might be disseminated with plants are steadily improving. Pernicious scale was found on a few potted trees in a Pretoria nursery during August, but the measures at once taken are believed to have eradicated the insect from the premises. This pest was not found in any other nursery, and the steps taken by the Division to prevent its dissemination by plant traffic and to induce the owners of infested trees to spray appear to be satisfactory.

After an almost total absence of four years from settled parts of the Union, migratory locusts were prevalent during the period under review in an area of pastoral country about 1,800 square miles in extent in the Middelburg, Steynsburg, Hofmeyer, Cradoek, and Molteno Districts of the Cape Province. The origin of the visitation is in doubt. No invading parent swarm was observed, and it is suspected that the swarms were developed from unnoticed locusts that had lived for a series of generations after the manner of non-migratory grasshoppers. Attention was first attracted to the pest during April, 1913, at which time the locusts were acquiring wings and were intermingled with grasshoppers. Enquiries showed that the insects were present on several farms in the vicinity of the Doornberg Mountain, a region that has long had the reputation of being particularly subject to the pest. By advertising in the press and by circulars distributed by the police patrols, the public in the affected districts was reminded of the obligation on occupiers to report egg-laying and to destroy the *voetgangers* when they appeared; but until the hatching of the eggs occurred it was not positively known that eggs had been laid on more than three farms, but the hatching disclosed that the pest was scattered over many hundreds of square miles. Fortunately, the Department had a large quantity of mixed locust poison and pumps in readiness, and it placed supplies in advance at the several police patrol stations in the area, and appointed Mr. R. O. Wahl, Lecturer in Entomology at Grootfontein, as Locust Officer. Mr. Wahl travelled upwards of a thousand miles from farm to farm in October and November, urging the occupiers to action and providing them with the necessary poison and pumps. The law requires that the Government supply the materials and that the occupiers of property destroy the *voetgangers* on their holdings. Most of the occupiers worked well but a few did not, and it is estimated that about ten per cent. of the insects escaped destruction as *voetgangers* and took to flight in late November and early December. Had it not been for the destruction measures, it is certain that an enormous area of the country would have been overrun with the succeeding generation, and it is probable that the conditions with respect to the pest would have been even worse than in the big locust year of 1907. As matters turned out, several swarms swept for hundreds of miles northwards across the Orange Free State. One penetrated into the southern part of the Transvaal, another into Basutoland, and another into Northern Natal. These swarms were much harassed by birds, and are thought to have been ultimately wiped out by this agency. They were not reported to have laid eggs anywhere, but there is a fear that some may have done so, and that owing to the drought in much of the region traversed there may be here and there vital eggs in the soil. Other swarms did not migrate, or migrated only a short distance eastwards. These were little molested by birds, and in a few weeks they were laying eggs abundantly. Egg-laying in January was contrary to all recorded previous experience with this species of locust, and it led the Division of Entomology to be prepared for the second generation that quickly followed, although there is no authentic record that the locust has before bred twice in one season. The *voetgangers* appeared on 132 farms, but everywhere the swarms were destroyed, and only scattered insects had a chance of becoming winged. No reports of any egg-laying or, indeed, of any winged insects, have been made. On the whole the campaign was very satisfactory and reflects great credit on the Division and on the Magistrates and Police, who co-operated willingly with the Department and assisted us materially. It is worth noting that the use of motor transport greatly facilitated the work of the Locust Officers.



Owing to the Division being short-handed during a greater portion of the year and the large amount of work due to the administration of the Agricultural Pests Act and in giving advice to farmers, the amount of research undertaken by the Division was limited; the principal work being the investigation of insect pests affecting Wattle trees in the Natal and the mealie bug and other pests in the Cape Province. Now the staff of the Division has been brought up to strength, and the Entomological work at the Agricultural Schools and Experimental Stations is being got under weigh, it is hoped the Division will have more time to devote to this important part of its duties.

#### DIVISION OF CHEMISTRY.

During the year Doctor B. de C. Marchant was appointed Assistant Chemist, and Mr. B. J. Smit, a former Assistant, who had been awarded a Scholarship for the study of Chemistry at Cambridge University, and had duly taken his Degree and Diploma in Agriculture there, returned. An office and laboratory Assistant was also appointed. Assistant Chemists have been provided at the Schools of Agriculture and the laboratory accommodation and equipment have been extended and improved. A Soil Chemist has been appointed at Elsenburg, and a highly-qualified Biological Chemist at the Veterinary Research Station at Onderstepoort.

Several Scholarships have been granted to young men to study Agricultural Chemistry at Cambridge, and one or other of the ruling Agricultural Colleges and Experimental Stations in the United States of America, with a view to qualifying for positions in the Division or the Schools and Experiment Stations, and when these young men return the chemical work of the Department should be fairly well provided for so far as staff is concerned. The great wants of the Division now are proper laboratories and facilities for small field experiments and pot cultures. The existing laboratories are structurally wholly unsuitable for the purposes for which they are used, and being situated in the centre of the town have no facilities for the outdoor work which is so essential to the prosecution of the work of a Division like this. Unquestionably the right course to adopt would be to erect the laboratory for the Division on the site suggested in my opening remarks, in the vicinity of Union Buildings, or to secure sufficient ground for experimental purposes on the Town Lands adjoining them. If this were done the Division would be most conveniently situated both as regards the Department and the public, and its requirements well provided for. Owing to the strengthening of the staff of the Division, and the fact of a good deal of analytical and other chemical work, and the advising of farmers on the selection of manures and so forth, now being undertaken by the Schools of Agriculture and Experiment Stations, the Division has been relieved of much routine work, and has been able to devote more attention to investigation.

During the year 505 samples of soils, fertilisers, lime stones, dips, insecticides, foodstuffs, waters, etc., were received and reported upon. The result of the analysis of soils, of which there was a very large number, is distinctly interesting. The result of a series of experiments on mealies conducted at Koedoe's Poort, near Pretoria, for the past three years, is included in the report.

#### DEPARTMENT OF PUBLICATIONS.

In December, 1913, Doctor Macdonald, who succeeded Mr. McDermot as Editor of the *Journal* in October, 1912, resigned, and Mr. Choles was appointed Acting Editor.

Doctor Macdonald was the Editor of the *Transvaal Agricultural Journal* before Union, and shortly after Union was appointed Editor of the *Union Journal*. He was also Dry Land Agronomist for a time, both for the Transvaal and Union Departments of Agriculture.

As Editor he brought the *Transvaal Journal* in the front rank of Agricultural publications and he maintained both it and the *Union Journal* on a high level, and by his enthusiastic advocacy of dry farming, and his insistence upon the timely and thorough cultivation of the soil, he did much to improve the practice of farmers generally and to bring under cultivation much land previously deemed to be too dry for the growth of crops; he also pleaded earnestly for the extension of Agricultural education, and the thanks of the country are due to him for the services he rendered to it in his various capacities.

Since the *Journal* has been issued free the circulation has increased considerably, and at the end of the year 32,000 copies were issued in English and 13,000 in Dutch. When it was decided to abolish the charge for the *Journal* it was thought by the Government Printer that the additional revenue that would be received for advertisements on account of the larger circulation would equal the cost of printing the *Journal*, but this has not proved to be the case.

Our aim has been to maintain the *Journal* as an organ for the publication of information acquired from the experiments and observations of the officers of the Department and for articles written by them for the enlightenment of the farmers, and not as an Agricultural newspaper on the one hand or as a record of scientific research, such as would appear in the transactions of a learned society on the other.

#### LIBRARY.

During the year the Library was moved from the hall it occupied in Church Square to a spacious and beautiful room in Union Buildings, which was specially designed for the purpose of a Library, and as good fortune would have it, was situated in the centre of the offices allotted to the Department.

A collection of books and periodicals dealing with the various phases of Agriculture and Agricultural Science is absolutely necessary for a Department of Agriculture under any circumstances, for without them the officers of the Department cannot possibly get on with their work and keep up to date, and it is doubly necessary in a country like this where there are no large libraries such as are to be found in most other countries, containing practically complete collections of agricultural literature, that can be consulted in case of need. Indeed, until the Library of the Transvaal Department of Agriculture, which constituted the nucleus of the present Library, was created, there was no collection of Agricultural books of any importance in South Africa. Our aim is to form a Central Library for the use of the Department generally and also to provide the Divisions with such books as they are constantly in need of, and the Agricultural Schools and Experimental Stations with Libraries sufficient for their pressing requirements.

The Library is still far from complete, but a good beginning has been made, and it is being added to by exchanges and by purchases, as funds permit. As it is, the Library is proving of great service to the Department and also to members of the public interested in Agricultural matters, by whom it is frequently used, and who previously had no such facilities at their disposal. The fact of the Library being in the midst of the Department instead of apart from it, as formerly, has greatly increased its usefulness.

During the year 496 books were received, and through the courtesy of the Director of Prisons 150 volumes were bound free of charge; this brings the total number of *bound volumes* to 3,934. The books in the Divisions and in the School Libraries total 11,298, and are included in the general catalogue deposited in the Central Library; 1,192 periodical publications were received by subscription or as exchanges.

There is a considerable and growing demand amongst farmers and others interested in farming for books relating to Agriculture, and if a circulating Agricultural Library could be formed it would prove most useful.

#### DIVISION OF CO-OPERATION.

Owing to lack of the necessary legislation in the Cape and Natal Provinces the work of the Division has been mainly confined to the Transvaal and to a lesser extent the Orange Free State, where legislation was introduced at a later date than in the Transvaal. During the year three societies were established in the Orange Free State. At the present time there are twenty societies in the Transvaal with a membership of 11,791, and in the Orange Free State there are four societies with a membership of 388. The operations of the societies have been chiefly devoted to the sale of mealies £400,000, and other produce £87,423, and tobacco approximately £86,000, and to the purchase of agricultural implements, manures and seeds £193,684. The total turnover of the societies last year was: sales £767,117, purchases £193,684.

Under the Co-operative Acts the members of a society are jointly and severally liable for the debts of the society. No capital is subscribed by the members, but money is borrowed from the Land Bank and from private banks to enable the societies to make advances to members depositing produce with



them for sale. The advances made to societies by the Land Bank at the beginning and end of the year were £212,000 and £292,800 respectively.

As the figures quoted show, the societies have made rapid growth, and their membership and turnover are very large. Last year the societies handled 639,452 bags of mealies, and they have done much to stimulate mealie growing and to help farmers to obtain better prices for their grain, and the consumers to obtain their supplies more regularly and in better condition. The tobacco and citrus fruit industry in the Rustenburg district have been placed upon an entirely different footing by the organisation of the growers and the instruction of the experts of the Department; and the growth of cotton, which is now beginning on a commercial scale, and bids fair to be of immense importance to the country, is materially assisted, if not rendered possible, by the co-operative ginmery.

The farmers have also greatly benefited by obtaining implements, fencing material, artificial manure, grain bags and supplies generally through the societies. The Superintendent reports the majority of the societies to be sound, but unfortunately not all, and the condition of some of them and the manner in which they are conducting the business is far from satisfactory.

As explained in my last report the Government has no jurisdiction over the Co-operative societies established in the Cape before Union, and in the Orange Free State before and shortly after Union, except such as was reserved when loans were granted. Those societies also have had a chequered career, some of them have done well, others are struggling along, and a number have failed. On the whole the Creameries have succeeded best, and have exercised and are likely to exercise a great influence on the Dairy industry, though those in the Orange Free State were seriously affected by the drought of the past two seasons.

In addition to the societies established under the Acts or under the auspices of the Government there are a number of Societies or Companies existing in different parts of the Union that have been formed by farmers for their mutual assistance and are being conducted on Co-operative lines. A Co-operative warehouse, for the handling and sale of Turkish tobacco, has recently been established at Paarl, and several societies or *círeles*, as they are called, have been formed in the Eastern Province of Cape Province for the collection and marketing of eggs. The Department has no official connection with these societies, but the Heads of the various Divisions render them such assistance in the shape of advice as may be in their power to give, and there is reason for believing that many of them are prospering.

On the whole, Co-operation has been taken up and supported far more freely in South Africa than the history of the movement elsewhere and a knowledge of the character of the people and of the nature of the country would have led one to anticipate, and as stated, great benefits have already been derived by the operations of the societies, and there can be little doubt it is destined to be of the greatest importance to the country, for in these days of severe competition amongst farmers, not in their country of residence alone, but in the markets of the world, organisation and the stimulus and education which are obtainable through Co-operative Societies are indispensable; particularly are they necessary for small farmers such as we hope to see more numerous here.

That trouble should have occurred with any of the societies is regrettable, though not surprising, for the establishment of Co-operation amongst farmers on a firm basis has been a long and uphill job in every country in which it has been attempted, and in this country the difficulties that seem to be inseparable from the movement are greatly increased by the distance farmers live from one another, and the imperfect education of many of them; further, in most countries Co-operative Societies have grown gradually from small beginnings, but here some of them have developed rapidly, and have had a large volume of business to transact almost as soon as they were formed, consequently the members have not had the same opportunity of becoming educated up to their work as they would have had, had the development of the societies been more gradual.

The troubles that have arisen in connection with societies formed under the Co-operative Acts, or to whom money has been lent by the Government, have been caused partly by lack of discretion and business knowledge on the part of the Directors, and in some cases by wilful wrongdoing and contravention of the spirit or letter of the law, but more largely for want of sufficiently keen and sustained interest on the part of the Directors and members. In many instances Directors of Societies have treated their duties



too lightly, and instead of looking into things themselves and keeping careful watch over the accounts, have relied too much upon secretaries and managers, who have often suffered from the same defects as the Directors.

It was thought that the provision in the Transvaal and Orange Free State Acts rendering members collectively and individually liable for the debts of the society would have induced them to look after their business, but even this has proved insufficient in many cases, and it is to be feared that the ease with which societies have obtained money—in the case of the Cape and Orange Free State Societies from the Government direct, and in the case of the Transvaal Societies from the Land and other banks—has tended to make them careless and extravagant and to encourage speculation and the making of unduly liberal allowances on produce forwarded to them for disposal.

There has been a tendency on the part of some societies to hold their produce in the hope of a rise in price or, in other words, to speculate. This is greatly to be deprecated. The time-honoured rule that farmers should sell their produce whenever it is ready for sale is undoubtedly the proper one for Co-operative societies to adopt, for in addition to the chances of prices falling instead of rising, there is also the expense of storing the produce and the risk of its being damaged by damp and from other sources even in the case of merchants who have far better opportunities of forming an opinion of the prospects of trade than the societies have. Speculation is also very detrimental to trade. It must be clearly understood that the above remarks are not intended to apply to the making of contracts by Societies for the supply of produce in regular quantities to consumers throughout the year and keeping sufficient in reserve after harvest to fulfil the contracts, which is a very useful and legitimate part of their business.

The selling of articles by the societies to the members on credit instead of for cash, except in cases where the members have a contra account with the society for produce supplied, is also contrary to the generally accepted principles of co-operation, and should be discouraged, if not entirely prohibited. It is likewise questionable whether the areas over which some of the societies operate are not too large. It is true the expenses of administration, which are usually very heavy in this country, may be relatively less in the case of large societies than of small ones, but on the other hand it is more difficult for members and directors to meet and supervise the work of the society as closely as is desirable, and it is very probable that the indifference of the members of some of the societies to the proceedings of the society have been due to this cause. Further, one of the chief benefits of co-operation—education—is to a great extent defeated if the members cannot readily get into touch with each other and with their society and the Department. Of course the societies must be linked together as they are at present by the Central Agency or some similar organisation in order to facilitate collective sales and purchases and to avoid their competing with each other, but this does not in any way concern the size of individual societies or units.

The Division has done its best to advise and direct the societies, though unfortunately the staff has not been sufficient to devote as much attention to some of them as required. As previously remarked, the troubles into which the societies have fallen are largely the result of youth and inexperience, and the easy-going disposition of the farmers, and it cannot be too strongly emphasised that it is only by constant supervision that the societies can be prevented from going astray, and educated up to transacting their business properly.

It may be asked, will the expenditure on teaching people to manage what after all is their own business and for their own benefit to do well, and to prevent them from going astray and being imposed upon is justified; the answer is a thousand times. The benefits to be derived from co-operation are enormous, as can be seen from what has occurred in countries as dissimilar as Denmark and Ireland, and it is doubtful whether any greater benefit could be conferred upon this country than the establishment of a thoroughly sound system of Agricultural Co-operation. In most countries the farmers have been reluctant rather than otherwise to co-operate, and it has been a difficult and tedious job to induce them to do so, and it is highly desirable that the most should be made of this desire to combine, which in itself is a great advantage.

The Secretaries must be watched and trained, and any contravention of the Act or of the Regulations framed thereunder must be checked immediately.

It has been suggested that as the Land Bank has to inspect the societies from time to time to see that the loans granted by it are safe and being properly used, that the Bank might assume entire responsibility for the

societies. It is argued that owing to only one body being concerned with the societies instead of two as at present, a considerable saving would be effected. The objection to such a course is the fear that the Land Bank might not assist the Co-operative Societies and preach co-operation and promote the movement generally to the same extent as the Division does, and that consequently the movement would suffer. The alternative would be for the Division to inspect on behalf of the Land Bank. There are objections to that also, and though of course the Division is at any time prepared to furnish the Land Bank with any information in its possession regarding the societies I think it is better for the Bank to conduct its own enquiries and that the two inspections are justified.

A Co-operative Act for the Union should be passed as soon as possible.

The Transvaal Act, which is fairly up to date, and has proved sound and workable, would furnish a good basis for such an Act, though the possibility of making further provision for preventing societies exceeding their legitimate functions, and for keeping them up to the mark as far as accounts are concerned, and of protecting the members from the misuse of funds or from dishonest or incompetent Directors, must be carefully considered.

The Transvaal Act recognises one type of society only and the possibility of assisting any *bona-fide* Co-operative Society and of protecting the members if necessary should be gone into. Co-operative Societies for the insurance of live stock, and against loss by hail, and egg circles and so forth, in which the unlimited liability principle is not necessary, are greatly needed and should be provided for.

#### DIVISION OF BRANDS AND FENCING.

The new Fencing Act is working very satisfactorily on the whole and fencing is proceeding briskly.

The provisions of the Act which render it obligatory for adjoining owners to share the cost of boundary fences in proclaimed areas have been extended during the year to thirty-three new areas in the Cape, eighteen in the Transvaal, and five in the Natal Province. The whole of the Orange Free State and Natal, with the exception of Zululand and the Districts of Utrecht and Vrijheid, were obligatory areas when the Act came into force.

Fifty-six farms were ordered to be fenced during the year on account of East Coast Fever, and it has only been found necessary to fence five farms departmentally.

Where fences are prescribed by the Minister with the object of preventing the spread of East Coast Fever it is essential they should be erected promptly. In the great majority of cases they have been erected with reasonable despatch, but there have been instances in which owners have deliberately or through negligence delayed in carrying out the work to such an extent as to defeat the purpose for which the fences were intended, and it might be well to fix by Law a definite period for the erection of such fences, and make it a punishable offence for an owner to exceed the period.

The Law at present gives the Department the right to fence on behalf of owners where it is considered necessary, but this right is exercised with reluctance for, apart from the fact that it is as well, if possible, to induce farmers to undertake the fencing of their own accord, fences erected departmentally are as a general rule more expensive than those erected by farmers, who make use of their own labourers and transport, and it is not desirable that the Department should embark on an undertaking which would involve an increase of staff to control it.

During the year 692 Brands were registered in the Transvaal, 182 in the Cape and 50 in the Orange Free State Province. Nine hundred and five branding irons were issued at cost price, and £245 was collected in registration fees.

Branding affords an easy and sure method of identification and thus lessens the difficulty of controlling the movements of stock with a view to the prevention of the spread of disease, besides reducing the risk of losses through straying or theft. At present there are no means of registering brands in Natal, while the systems which obtain in the Cape and Orange Free State leave much to be desired. The three-piece system in the Transvaal, which was adopted from Queensland, works quite satisfactorily, and it is highly desirable that a uniform and up-to-date system on the same lines as it should be inaugurated for the Union.



## DRY FARMING.

This Division has carried on its experimental and propaganda work with unabated vigour, and though there is nothing new in the principles enunciated, yet owing to object lessons provided by the Dry Lands Experimental Station and the trials of different varieties of crops and methods of cultivation made at them, and also to the interest originally awakened in Dry Farming by Dr. Macdonald, and continued by the exhortations and teaching of the present Superintendent, a great stimulus has been given to the better cultivation of the soil. There has been a considerable extension of cultivation in areas formerly regarded as too dry to be capable of producing crops, and there is little doubt that by following the methods advocated by the Division many farmers suffered far less from the drought last year than they otherwise would have done. An interesting account of the results of the experiments conducted by the Division at the Experimental Stations and elsewhere is given in the report of the Superintendent, from which it will be seen that despite the drought the yield of crops on the whole was better than the previous year.

The Superintendent states that farmers are beginning to supplement the experiments conducted at the Stations by experiments on their own farms. This is good news, as it indicates that the farmers are really interested in the movement and are anxious to do what they can on their own behalf to improve their practice, and it also shows they are beginning to realise that though the results and observations obtained at Experimental Stations and from analyses and soil surveys may be extremely useful, soils and climate vary so greatly that the only way of ascertaining with certainty what methods of cultivating crops and manures are best adapted for a particular farm or portion of a farm, as the case may be, is by actual trial on the spot.

The necessity for making such tests is continually preached by Agricultural Experts; they are simple and inexpensive to carry out, and if properly undertaken furnish first hand and conclusive information. In a recent article on Dry Farming, (\*) Mr. E. Chilcott, who is in charge of the Dry Farming work of the United States of America Department of Agriculture, discusses this subject and lays stress on the impossibility of elaborating any general system of dry farming suitable for all conditions, and on the necessity of farmers learning by careful observation and experiment on their own farms, the problems involved, and the best method of dealing with them.

The officers of the Division will be glad to assist farmers in devising experiments, and they are also co-operating with Farmers' Associations and Municipalities in conducting experiments, at various centres, which are subsidised on the £ for £ principle.

## GUANO ISLANDS.

The yield of Guano for the 1913 season was exceptionally good, being 7,441 tons, an excess of 1,068 tons over that for 1912.

Six thousand tons were offered for sale, and the balance was held in reserve to meet future requirements.

During the past few years the demand for Guano has been greater than the supply, due no doubt to the extension of the distribution to the whole Union, the development of farming, and the appreciation by farmers of the cheapness of the manure, which is sold considerably below market value.

The allotment of the available supply is a matter of some difficulty, and though the system which was brought into force last year, and which was again used this year, is not altogether satisfactory for the reasons set forth in the Superintendent's report, it seems, under all the circumstances, to be the best that can be adopted.

Two distributions were made during the year ended 31st March, 1914, one in July, 1913, and one in February, 1914. 15,450 bags were available for distribution in the former month and 46,324 bags were applied for, the applications being subsequently reduced to 39,431 bags. In the latter month 45,660 bags were available, and applications were received for 139,320 bags.

The total number of seal skins taken during the 1913 season was 6,410, as compared with 6,209 during the 1912 season, and the average price realised was 17s. 2½d., as against 30s. 6¼d.; the drop in prices being due to a slump in the Fur Skin market.

\* Dry Farming—Britannic Year Book, 1913, pp. 418-20.



The crop of Penguin eggs realised £2,166 13s. 4d.

The expenditure during the year amounted to £32,125 16s. 6d., and the revenue to £46,348 6s. 3d., of which orders for Gnano accounted for £39,732 4s. The nett profit for the year, according to the Profit and Loss Account, came to £17,994 7s. 1d.

#### GRAIN DIVISION.

Owing to the unfavourable season the 1913 Maize crop again yielded badly and was so poor in quality as to be quite unlike the ordinary South African Mealie; the Oat and Wheat crops, while good in the South-West, were poor in other parts of the Union.

During the financial year ended 31st March, 1914, 234,676 bags of Maize, 16,074 bags of Oats and 23,934 bags of Chop were exported, besides small quantities of Kaffir Corn, Crushed Maize and Wheat, as against 768,292 bags of Maize, 76,253 bags of Oats and 28,064 bags of Chop the year before.

The chief reasons for the reduced export were the bad crops, the feeding of stock with grain to a larger extent than usual on account of the drought, and farmers holding over Maize in the hope of a rise in price.

As no Maize was shipped early in the season there were practically no rejections on the score of wetness. The great bulk, however, though sound, was thin and badly grown, and generally not at all up to the usual standard of South African Maize.

Representations were made to the Department during the year that it would be as well to lower the grades of Maize on account of the inferior quality of the 1913 crop. The matter was laid before the Maize Committee at Kimberley, with the result that the grades were slightly lowered. This appears to have been a mistake, for complaints were received from buyers in Europe that the Maize was not so good as they expected it to be, and it seems that since our Maize has such a good name in the European markets it would be advisable to revert to the old standards and not change them in future.

The experience of previous years in which Maize became dearer as the season advanced, coupled with the drought, induced the farmers to hold on to their crops in the hope of obtaining better prices later in the season. This proved to be unwise, for when it became apparent that the 1914 crop was likely to be a moderately good one, as far as yield was concerned, and of very good quality, the farmers found that it was useless to hold back any longer, and they were compelled to sell on a falling market, in addition to which they suffered loss in many cases through their Maize being damaged by weevils and the bags by keeping.

Large consumers like the Railway Department and the Mines are making use of the Government grades when buying their supplies locally, and the standards set by the Department are now universally recognised and adopted.

The Annual Maize Conference was held at Durban on the 4th of July, 1914, when many matters of importance to the industry were discussed.

#### FIELD CORNETS.

Provision has only been made for the payment of these officers for a period of two months in the Estimates now before Parliament, as it is anticipated the office of Field Cornet will shortly be abolished, and that of Justice of the Peace substituted, and that those officers, when appointed, will be dealt with by the Department of Justice.

#### OSTRICH INVESTIGATIONS.

A brief report by Professor Duerden, of Grahamstown, on the investigations conducted by him, with the assistance of a grant from the Department, is included in the Appendices.

An account of the birds obtained from North Africa will be included in the Annual Report of the Grootfontein School of Agriculture.

As will be seen from the report, Professor Duerden was largely occupied in investigating the parasitic diseases of ostriches, and the Division of Veterinary Research has also been enquiring into the same subject, so there is little doubt that, as the result of their work, our knowledge of the diseases and treatment of the ostrich will be greatly increased.

The outstanding feature of the Ostrich industry was the collapse of the market for feathers. For the past quarter of a century the Ostrich industry has enjoyed an era of remarkable prosperity, but owing to a combination of circumstances, including changes in fashion, the introduction of the Anti-plumage Bill and greatly increased production, the demand for feathers suddenly ceased, and it is feared it will be some time before it will revive, though the ostrich feather is such a beautiful thing in itself and so becoming to the fair sex that it will always be used, though, in common with other articles of luxury, the demand will fluctuate from time to time.

Arrangements have now been made whereby the investigations, formerly undertaken by Professor Duerden at Grahamstown, will in future be conducted under his direction at Grootfontein.

#### GRADING OF WATTLE BARK.

At the request of a number of prominent Wattle growers in Natal, supported by the representations of the Trades Commissioner, it was decided to undertake the grading of Wattle bark at Durban prior to shipment, on much the same lines as have been adopted for grain and fruit.

Several Conferences of growers and shippers of bark were held to discuss the grades and method of grading, and a Standing Committee of growers and shippers was appointed to act as advisers to the Department.

Grading by the Government has proved most useful in the case of mealies and fruit, and no doubt it would prove equally if not more so in the case of bark, provided it can be carried out, but the grading of bark is far more difficult than the grading of either of those products, as there are at present no clearly defined and generally accepted standards by which bark is bought and sold, or any simple and reliable means of ascertaining the intrinsic value of the bark, and it is also difficult to obtain a representative sample of the contents of a bale or sack of bark quickly and without damaging the package.

After considerable discussion with growers in Natal and buyers in England and on the Continent of Europe, and also with Doctor J. Gordon Parker, Honorary Secretary to the United Tanners' Federations in London, and Professor H. R. Proctor, of the Leather Industries Laboratories in Leeds, to whom our best thanks are due, the following grades were determined upon:—

Grade Indicator.				Description.
H. 1	..	..	..	Heavy (choice).
H. 2	..	..	..	Heavy (fair average quality).
M. 1	..	..	..	Medium (choice).
M. 2	..	..	..	Medium (fair average quality).
T. 1	..	..	..	Thin (choice).
T. 2	..	..	..	Thin (fair average quality).
B. G	..	..	..	Below Grade.

Mr. Beurlen who is well acquainted with the bark trade was appointed grader. The grading of bark is optional and whether or not it will be continued depends upon its being found to be feasible, and the support accorded to it by exporters.

The best solution of the problem would be the extraction of the tannin from the bark and the export of the extract in solid or liquid form; as this would reduce the cost of carriage, widen the market as many tanners will only purchase extract, obviate the loss and waste incurred by the twigs not being stripped, and through bad curing, and provide an additional industry in the country.

A great many experiments have been made with a view to discovering a practical method of extracting the tannin, and there are good reasons for believing that the preparation and shipment of extract will soon be a *fait accompli*.

Investigations are being conducted by the Chemist and Botanist at Cedara into the influence of local conditions, and age and variety of tree, and other factors upon the production of tannin, and it is hoped that before long our knowledge in these matters, which at present is slight and vague, will be materially increased, and it may then be possible to devise some more scientific method of arriving at the value of the bark.

#### EXPORTS AND IMPORTS.

A list of the chief exports and imports of agricultural produce and of articles used for agricultural purposes for 1913, is included in the appendices.

[U.G. 2—'15.]

The list is extremely disappointing, for with the exception of the exports of wool and hides, which show a satisfactory increase, and of ostrich feathers, which show a small increase, there is a heavy decline in practically all our exports of agricultural produce, and a substantial increase in the foodstuffs imported.

The export of Maize, after allowing for the re-imports, fell to £1,516, against £443,425 the year before, due to the diminished yield of the crop owing to the drought and to more of the grain being fed to live stock to atone for the deficiency of the veld. The exports of other grain and meal amounted to £51,607 compared with £121,115 the year before; the export of fruit was slightly lower, and of Angora hair considerably lower.

On the other hand, the value of the wool exported amounted to £5,719,288 against £4,780,594 the year before, and the exports of hides and skins and of ostrich feathers showed increases of £326,821 and £343,949 respectively over the previous year.

The imports of foodstuffs of all kinds, with the exception of butter, beef and mutton, were greater than the year before. The imports of wheat and wheat flour amounted to £1,758,438 against £893,299 the year before. Beans and peas, dholl, rice, fruit, sugar, cheese, condensed milk, eggs, ham and bacon lard, preserved meat, confectionery and jams, and fish, all show a large increase. The fact of our having to send no less than £858,317 out of the country for butter and butter substitutes, cheese and condensed milk, and £74,909 for eggs is a sad reflection on our enterprise and thrift.

The imports of agricultural implements and machinery decreased somewhat, but on the other hand the importations of manures, sheep dip, fencing material, windmills and potatoes increased. The value of the agricultural produce exported amounted roughly to £12,285,500 against £11,164,000 the year before, and the value of foodstuffs imported, which with a very few exceptions could be produced here, amounted to over £5,634,000, as against £4,321,000 the previous year.

#### ADULTERATION OF WINE, SPIRITS AND VINEGAR.

A report on the administration of the Wine, Spirits and Vinegar Act by Mr. du Toit, who has been entrusted with the work, is subjoined, from which it will be seen that out of 155 samples of wine and 191 samples of brandy only 4 samples of wine and 12 of brandy were found to be adulterated or deficient.

During the period from the 1st April, 1913, to the 1st July, 1913, on which date the Wine, Spirits and Vinegar Act No. 15 of 1913 came into operation so far as the Cape Province is concerned, 238 samples of wine, brandy, whisky and vinegar were purchased under Cape Acts Nos. 42 of 1906 and 19 of 1908, and submitted to analysis, the results of which are shewn in the table subjoined, viz.:—

Article.	No. of Samples.	Adulterated or deficient.	Incorrectly labelled.	Artificial or not genuine.	No. of Prosecutions.	No. of Convictions.
Wine ..	91	4	7	1	11	5
Brandy ..	79	4	7	—	10	6
Whisky ..	4	—	—	—	—	—
Vinegar ..	64	10	—	10	20	13
Total ..	238	18	14	11	41	24

Licensed dealers were warned as to complying with the terms of the new Act, and a commencement was made with the purchase of samples thereunder on the 1st September, 1913, and during the period from that date to the 31st March, 1914, 498 samples were purchased in 36 Districts of the Cape Province, viz.: Albany, Albert, Aliwal North, Beaufort West, Bedford, Caledon, Cape Town and environs, Cathcart, Cradock, Ceres, De Aar, East London, George, Hope Town, Kimberley, King Williamstown, Malmesbury, Molteno, Mossel Bay, Oudtshoorn, Paarl, Piquetberg, Port Elizabeth, Queenstown, Robertson, Stellenbosch, Steynsburg, Stutterheim, Swellendam, Somerset East, Somerset West, Tarka, Victoria West, Wellington, Wodehouse and Worcester.



The results of the analyses are shewn in the subjoined table:—

Article.	No. of Samples.	Adulterated or deficient.	Incorrectly labelled.	Artificial or not genuine.	No. of Prosecutions.	No. of Convictions.
Wine ..	50	—	17	3	11	9
Brandy ..	109	8	11	—	15	13
Whisky ..	69	1	14	—	12	11
Gin ..	65	5	13	9	16	11
Rum ..	55	28	11	—	15	7
Vinegar ..	50	17	28	5	31	26
Total ..	498	59	94	17	100	77

15.26 per cent. of the samples purchased under Act No. 15 of 1913 were, therefore, found to be adulterated, deficient or not genuine, but for this high percentage rums, vinegars and gins were, it will be observed, primarily responsible.

Those provisions of the Act dealing with rum and gin are new, and some little time has necessarily to elapse before conformity with the requirements of the Act in these two respects will be secured. So far as can be ascertained, however, an honest endeavour is being made by merchants to comply with the standards laid down.

In addition to the above, 85 liquors were analysed on importation, with the result shewn:—

Article.	No. of Samples.	Adulterated or deficient.	Incorrectly labelled.	Artificial or not genuine.	Refused admission into Union.
Wine .. .. .	14	—	—	—	—
Brandy .. .. .	3	—	—	—	—
Whisky .. .. .	14	—	2	3	5
Gin .. .. .	8	—	—	—	—
Rum .. .. .	6	3	1	—	4
Other Spirits .. .. .	2	—	—	—	—
Beer .. .. .	5	—	—	—	—
Vinegar .. .. .	32	—	1	4	5
Acetic Acid .. .. .	1	—	—	—	—

NOTE.—Other importations, known to comply with the Act, were not examined. Liquors incorrectly labelled were admitted if first re-labelled according to law.

On the promulgation of the Act of 1913 objections were raised from Great Britain to the limits placed on the amount of potassium sulphate in wine. The Sherry Shippers' Association stated that the sherry trade would be adversely affected thereby, while the Wine and Spirit Association remarked that if the Act were strictly enforced it would be impossible for merchants of any country to ship sherries and sauternes to the Union.

Analyses made from time to time of imported sherries show that twenty-one comply with our standards. Further analyses of sherries and sauternes will be made to ascertain whether the contention of the Associations mentioned are borne out so far as the South African trade is concerned.

While it may be found practicable to allow the maximum amount of potassium sulphate to be raised slightly, it would, in the opinion of the Government Viticulturist, be inadvisable to extend the maximum amounts of free and combined sulphur dioxide permitted by the Act, but a definite pronouncement on this point must await the results of the further analyses which will be made.

It was represented by several parties that there was little doubt that sugar was being added to wine for sweetening purposes in contravention of the law. Enquiries show that all the reports were traceable to a single source. Extensive investigations were, however, set on foot, but no evidence could be obtained to

corroborate the allegations made. The reports gained credence on account of the decrease in the quantity of boiled grape juice (mostkonfijt) used as a sweetening substance, which falling off was about fifty per cent. between 1912 and 1914. It seems to have been lost sight of, however, that jeripico (fortified grape juice) as a sweetening substance has been gaining in favour during the last four years. The examination of the books of wine merchants has revealed the fact that the increased purchases of jeripico have furnished the amount of sweetening material required to replace the decreased use of mostkonfijt. Account has also to be taken of the sweet wine purchased for mixing with other wine. A certain amount of cane sugar is used by all wine merchants for one or more legitimate purposes, such as in the making of gin, sweetening of brandy, and the manufacture of liqueurs and cordials.

I would not go so far as to say that adulteration of wine with cane sugar does not take place, but with the machinery at my disposal, which is fairly considerable, I have been unable to detect such illegal use. In order to make absolutely sure that no cane sugar is added to wine, the law will require to be amended. The additional legislation required for this purpose is under consideration.

P. J. du TOIT,

Under Secretary for Agriculture

(Officer administering Act No. 15 of 1913).

#### FERTILISERS, FARM FOODS: CONTROL OF SALE.

During the year 1913, 253 brands of fertilisers were registered, and 17 farm foods, as against 207 of the former and 3 of the latter in the previous year.

The Government Analyst, Capetown, remarks: "The effect of the law on the grades of fertilisers imported into the country became evident as soon as one class of fertilisers (superphosphates) was graded according to chemical composition. This is seen from a comparative table of the number of superphosphates registered in each grade during each of the last four seasons, thus:—

	1909-10.	1910-11.	1911-12.	1912-13.
Under Strength .. .. .	0	1	0	0
Low Grade .. .. .	19	12	0	1
Medium Grade .. .. .	14	3	2	2
Medium High Grade .. .. .	31	32	10	13
High Grade .. .. .	39	79	73	85
	103	127	85	101

In other words, the superphosphates imported now are practically all of the higher grade, whereas before these higher grades included no more than 70 per cent. of the total imports of superphosphates."

The need for a law for the whole Union controlling the sale of fertilisers has been impressed upon the Government by Farmers' Conferences for some

years past, and it is hoped that an opportunity will present itself at an early date for introducing a Bill into Parliament.

#### FERTILISERS IMPORTED INTO UNION.

Name.	1913.		1912.	
	Quantity. Tons.	Value. £	Quantity. Tons.	Value. £
Basic Slag .. .. .	5,970	11,411	“ With all other N.O.D.”	
Bone Manure .. .. .	4,714	20,103	3,495	14,366
Guano .. .. .	351	1,205	456	1,795
Nitrate of Soda .. .. .	73	687	Included in “ all other N.O.D.”	
Phosphates (Raw) .. .. .	761	1,705	do.	do.
Potash Manures .. .. .	1,997	18,107	do.	do.
Sulphate of Ammonia .. .. .	400	4,707	do.	do.
Superphosphates .. .. .	41,013	95,273	32,616	83,186
All other N.O.D. .. .. .	8,585	35,233	6,367	25,164
Totals .. .. .	63,864	£188,431	42,934	£124,511

#### AGRICULTURAL SOCIETIES.

Following the example of the Cape Province, the Transvaal Provincial Council has taken over the administration of grants-in-aid to Agricultural Societies in that Province, so this Department is now only concerned with grants-in-aid to Societies representing the Union as a whole, and to Societies in Natal and the Orange Free State.

The amalgamation of the Agricultural Union and the Farmers' Association and the Western and Eastern Province Boards of Horticulture in Cape Province, which has been discussed for so long, has now taken place, and will be a great advantage from every point of view.

The Breed Societies, referred to in my last report, are gradually becoming established, and if properly conducted and supported cannot fail to raise the standard of the breeds they represent and to promote their interests, and by doing so to assist the country generally, for pure-bred stock suitable for stud purposes is greatly required here.

Societies for ascertaining and recording the milk and butter fat yields of cows are also being discussed, and one, if not more, Societies have already been formed; these Societies should also prove most useful. The Dairy Division is assisting them as much as possible, and grants on the £ for £ principle for limited amounts are being made to them by the Department.

Despite the drought the larger Agricultural Shows have prospered wonderfully, both in respect to the quantity and quality of the exhibits and in the provision made for them, and in the support accorded to them by the public, and undoubtedly they are doing a great deal to improve the live stock of the country, and to a certain though lesser extent, grain and other products of the arable land, for with the possible exception of maize and of fruit at a few Shows, far more interest is taken in live stock than produce.

The Witwatersrand Agricultural Society made a new departure for this country at their last Show by obtaining a gentleman from Ireland to judge thoroughbred horses at their Show. It is always difficult to obtain good judges, particularly in new and thinly populated countries; this procuring of an eminent judge from overseas, besides providing a good judge, helps breeders here to obtain an idea of how their animals and the lines on which they are proceeding compare with those in the home of the breed, and has an educative and stimulating effect generally, and the Society is to be commended for its enterprise.

Many of the smaller Shows were severely affected by the drought, and a few whose existence was scarcely justified or were unduly ambitious and extravagant, are in difficulties, but on the whole they were well conducted and successful.



The usefulness of small local Shows is sometimes questioned, and the opinion expressed that there are too many small Shows, and that a few good central Shows should suffice for the needs of the country. Personally, I should be sorry to see the small local Shows discouraged, though I also believe in raising the central Shows to as high a level as possible.

There are many people who would exhibit at or attend Shows held in the district, who could not afford the time or expense of attending or exhibiting at Shows held at a distance, or who would not send stock to them because, though quite useful, they were not up to the standard set at the large Shows, which are mainly supported by the large breeders of pedigree stock, wealthy farmers, and professional showmen. Small Shows also serve as stepping stones for young exhibitors and as feeders to the larger Shows.

The chief errors committed by the smaller Shows, and which have helped to bring them into disrepute, are the aping of the larger Shows, too lavish expenditure, and sometimes unbusinesslike methods, but these are not the fault of the system, and local Shows need not be costly, and if properly conducted are capable of fulfilling a most useful purpose.

The growth of Breed Societies is one of the features of recent years, and is a welcome sign of the times, for it indicates that various improved breeds of live stock are obtaining a footing in the country, and that the people who are taking them up are keen and alive to the necessity of maintaining the purity and quality of the breeds and of pushing them.

As the country is developed and more thickly populated, Societies like the Breed Societies, which confine their attention to particular objects, will become more common.

Speaking generally, the farmers are becoming much better organised than they were.

As usual the Department sent an exhibit designed to educate the farmers and to illustrate certain phases of its work, and a collection of live stock, to as many Shows as possible. Officers of the Department acted as judges at most of the Shows and delivered lectures and gave demonstrations at the majority of them.

#### AGRICULTURAL PRESS.

The press is doing a great deal to educate and uplift the farmers and is constantly becoming a more powerful factor in the agricultural world, and the thanks of the Department are due both to the purely agricultural papers which are attaining a high standard, and to the daily press for the assistance they are rendering in preaching the gospel of progress and in the diffusing of information relating to agriculture.

#### LEGISLATION.

Since my last report the following Acts were prepared by the Department and passed by Parliament:—The Dipping Tank Further Provision Act, which makes good an omission in the original Act and empowers the Minister to compel the construction of cattle and sheep dipping tanks on land belonging to non-resident owners in the event of cattle or sheep being allowed to run thereon; and the Wine, Spirits and Vinegar Act, the object of which is to prevent the adulteration and regulate the sale of these articles.

Bills to regulate the export of fruit and to amend the Co-operative Societies Acts in the Transvaal and Orange Free State were also drafted, but had not been passed at the date of this report. A Bill providing for the collection of agricultural and other statistics, which is a necessary preliminary to the collection of statistics, has been prepared by the Director of the Census and will, it is hoped, be passed and given effect to, as agricultural and other statistics are badly needed.

Bills dealing with the adulteration and sale of agricultural seeds and noxious weeds, and of farm foods and fertilizers, were also drafted, and it is hoped will become law next session, if not this.

A Co-operative Act for the Union is required, and also a Live Stock Brands Act and an Act dealing with creameries and dairy products.

If these Bills were passed the greater portion of the legislation administered by this Department or specially affecting farmers, such as the Land Bank, Land Settlement, and Irrigation Acts, would be consolidated and brought up to date.

## PERMANENT IMPROVEMENTS TO FARMS, WATER SUPPLY, TRANSPORT AND COMMUNICATION.

Farmers everywhere are developing their farms and rendering them more productive and economical to work by obtaining and conserving water by means of dams and boreholes, and in some cases by elaborate irrigation schemes.

Fencing is proceeding apace, and also the construction of dipping tanks for cattle and sheep. Farm buildings are being added to and improved as opportunity offers.

The extension and improvement of railways continue; bridges are being built, and roads and drifts put into better order, postal, telegraphic and telephonic facilities are much better than they were.

Sanitary and convenient live stock markets and abattoirs have been erected in most of the principal towns, and the position of the country to-day in respect to the above matters, all of which are of great importance to the farmers, is vastly superior to what it was a few years ago.

### LABOUR.

Labour remained much the same as last year; from some parts of the country complaints were heard of the scarcity and cost of native labour, but on the whole there was little change, and if anything native labour was a little more plentiful and cheaper.

Unskilled white labour is still very sparingly employed on the land; the majority of men who ought to be so engaged prefer to work or loaf in the towns, and have little liking for hard and continuous manual labour in the country.

The farmers also are as a rule not very keen on white labour; many of them think that for their style of farming native labour suits them better than white, and the cost of erecting decent houses for married white men, and the schooling of their children, likewise present serious obstacles to their employment.

Further, it unfortunately happens that many farmers are not capable of training white labourers, nor are they disposed to take the pains to plan out their work day by day and to exercise the supervision over them that is essential if they are to be employed with advantage.

Roughly speaking, native labour varies from 15s. to 40s. per month, according to the locality and class of boy, and whether they are allowed land for ploughing and grazing; exceptionally good boys and boys employed as drivers and so forth command a little more. It is difficult to give a price for white labour, but unskilled white labour probably ranges from 3s. to 5s. per day.

### WEATHER.

An account of the weather experienced during the year has been kindly furnished by the Director of Meteorology, and is included in the appendices.

The year will long be remembered as a particularly trying one for farmers. With the exception of the Orange Free State, in which the rainfall was 8.66 inches or one-third less than the average, the rainfall was not much below the normal, and the trouble was caused by the unfavourable distribution and the strong, hot, drying winds and high temperatures. The Spring was very dry, and the months of November and December were particularly hot and windy.

Succeeding as it did a dry year, the drought in the Orange Free State was very severely felt, and inflicted heavy losses on the farmers, many of whom had to trek with their stock.

### CROPS.

The yield and other interesting features of the majority of the crops have already been referred to in my remarks upon the Divisions of Grain, Horticulture, Tobacco and Cotton, and Wattle Grading. With the exceptions of the grain and fruit crops in the Western Province of Cape Province, which were not affected by the drought, and crops upon irrigated land, the crops throughout the Union were very poor.

A keen interest is being taken in mealie growing, and though last year the result was disappointing, the intelligence and energy that is being manifested in the crop cannot fail to improve it and to raise the standard of cultivation throughout the country.

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Hops are being experimented with in several centres throughout the Union in conjunction with Ohlsson's Cape Breweries, Ltd., and the South African Breweries, Ltd., and though it is too early yet to offer a definite opinion on the matter, it is not too much to say that in several instances the trials seem promising. Enquiries were made by a high authority on brewing in England of the possibility of obtaining supplies of the ordinary six-rowed barley; the export of this kind of barley to England is diminishing, and as it is wanted by brewers there there are prospects of a ready sale for it at good prices, provided the necessary supplies are forthcoming.

Despite the drought the farmers continue to break up more ground and to pay more attention to the cultivation of it and the importance of maintaining the fertility of the soil, a matter of supreme importance not only to individual farmers but to the country at large, is being more generally recognised.

### LIVE STOCK.

The drought was the cause of great loss and expense to owners of live stock, particularly in the Orange Free State, as in that Province the veld was practically bare, and except on farms fortunate enough to have permanent water for irrigation there were no forage or root crops to be derived from the arable land to supplement it. The losses of sheep have been alluded to, but probably the losses amongst cattle were heavier still, as in the early stage of drought cattle suffer more than sheep.

Profiting by previous experience and in response to the general desire for advancement, farmers have given more heed to the provision of water for stock by means of boreholes and so forth, and water for drinking was not so short as in previous droughts. The extension of railways also helped to relieve the situation to a certain extent by rendering it easier to transport stock from the areas most affected to areas where food was still available; reduced rates were granted by the Railways for stock moved on account of the drought.

Despite the depressing circumstances, farmers are steadily endeavouring to improve their live stock. As will be seen from the returns kindly furnished by the Director of Customs there was a considerable importation of pure-bred live stock, which in itself is a good thing, as much of our stock need grading up. As a rule the imported stock is better looked after than it was, but a good deal of it is still more or less neglected, with the result that much of the money spent in procuring it is lost. Further money is frequently wasted by importing unduly expensive stock, being purchased for use on cross-bred animals. When a sire for a good stud or herd is required too much care cannot be exercised in the obtaining of it, but for grading-up purposes and for use on inferior stock a good Colonial-bred animal is often preferable to an imported animal, as it costs less to buy and to keep, is less susceptible to disease, and is hardier and more active. The lack of discrimination between animals for stud and for crossing is also often discernible at our various sales of pure-bred stock, at which it not infrequently happens that animals for stud purposes realise less than their value, and animals for crossing more than their value.

To a certain extent the drought may help to improve the live stock, as the weak and inferior animals would naturally be disposed of or allowed to perish first, and it will also bring home to farmers the necessity for making still greater efforts to provide food and water for their animals, and the folly of overstocking, and being lulled into a false sense of security by a few good years.

The most interesting features of the importations have been the large number of cattle and sheep and the variety of the breeds of horses.

In America, Canada and Australia the heavier breeds of horses have been freely imported from the first, and constitute the bulk of their horses, but in this country, until quite recently, the horses imported have consisted almost entirely of thoroughbreds and Arabs, and had it not been for the horses brought over by the military authorities during the various wars and left in the country, and the few heavy horses imported for use in the towns, our horses would have consisted almost entirely of thoroughbred and Arab strains, and as it is they probably have more thoroughbred blood in them than the horses of any other country.

The tendency now appears to be to become more catholic and to introduce horses suitable for agricultural purposes as well as for riding.

Owing to the introduction of dipping and the good work accomplished by the Veterinary Divisions in dealing with the diseases that afflicted the country,



cattle farming has become a very different proposition to what it was a short time ago. The constant losses and work occasioned by lung-sickness and certain other contagious diseases no longer occur, and cattle can be moved from one part of the country to another or introduced from abroad, with much less risk than formerly, and many parts of the country otherwise eminently suitable for cattle but on which they could not be kept owing to East Coast fever and ticks, have now been rendered available, with the result there are prospects of a large expansion of the cattle industry in the near future.

As will be gathered from this and previous reports, considerable advance has been made in dairying. Friesland and other improved breeds of dairy cattle have been imported freely and farmers are beginning to realise that dairying is a special branch of farming, and that if it is to be successfully conducted the cows must be bred and fed for the production of butter fat, and are acting accordingly.

Where the conditions are favourable it is probable dairying will be found more profitable than the production of beef, and large quantities of dairy products are still required for local consumption, but there are many parts of the country and many farms not suited for dairying, on which beef cattle could be raised with advantage.

Several ranches have been established in Rhodesia, the Bechuanaland Protectorate and Swaziland, with a view to raising beef cattle, and though as far as is known no ranches have been started in the Union the question of utilising portions of the middle and low veld now made little use of, for the breeding of slaughter cattle, is being considered, and progressive farmers in the more advanced districts are also turning their attention to the production of beef. The beef and mutton produced in South Africa about equal the consumption, so if the meat industry expands as it is hoped, markets will have to be sought elsewhere for the surplus beef and mutton.

Fortunately this will not be difficult, for meat is rapidly becoming scarcer and dearer throughout the world. The United States of America, which until recently was the largest meat exporting country, and as late as seven years ago sent 231,599 tons of meat to England, is now unable to supply its own needs, and is actually importing meat. In the United States of America, Canada and England, cattle and sheep are decreasing, whilst the consumption of meat is increasing, so there can be no question of an outlet for the meat as soon as we are ready to send it, always provided it satisfies the requirements of the markets.

The export of meat is more difficult than the export of articles like wool, mealies and cotton, and it requires special organisation and facilities, but the country is well served by railways and steamships and has excellent ports, so no great trouble should be experienced in dealing with the meat when it is forthcoming. As with many other exports, the most trying period will be the time between a slight over-production and the production of sufficient quantity to export economically, but this should not prove a very serious obstacle, as most of the ships are already provided with cold stores and there are abattoirs at most of the ports.

Meanwhile the great thing to do is to produce the kind of animals required by the trade, for when our meat reaches England, which is the principal market for meat, it will have to compete with meat from the Argentine, Australia and New Zealand—countries that have spent vast sums of money and taken great pains to improve the quality of their stock and meet the requirements of the trade.

The cattle exported from those countries are mostly of the Shorthorn, Hereford and Aberdeen Angus breeds, though Sussex and North Devons would probably do as well.

Besides being well-bred—that is, almost pure bred or of a very high grade—the cattle must be well grown and properly fattened previous to slaughter. Animals stunted as calves or starved during some period of their lives will not make good beef, and old animals of either sex that have been worked for a long period or are coarse and staggy, are not required.

Despite the improvement that has been made in the quality of our cattle, a good deal of weeding out and grading up will be necessary before any considerable proportion of them will be suitable for export. We are fortunate in having a good market for our inferior beef in the compounds on the Rand, but against this must be set the competition from the large number of inferior cattle bred by the natives.

[U.G. 2—'15.]

Reference has been made to the establishing of ranches as indicating an advance in the cattle industry, but the fact must not be lost sight of that except in the case of very rich land with good grazing all the year round the cattle will require assistance from grain and forage crops from the arable land at certain seasons of the year and to finally finish them off for market. The large ranches in the Western States of America and Canada, which produced vast numbers of scrub cattle, are rapidly becoming things of the past, and are giving way to small holdings and more intensive farming, and the tendency now is for beef to become a product of mixed farming in those countries or of land put down to lucerne, as in the Argentine, or to artificial grasses, as in Australia and New Zealand.

Further, it must not be thought that beef cattle require little or no attention, and can more or less be left to look after themselves. The old saying that it is the eye of the farmer that fattens the beast is perfectly true, and the production of beef needs intelligent attention just as much as any other branch of farming.

The stud farms are provided for under another vote, but it may not be out of place to state that the Government has decided to close them and to discontinue the leasing of stallions. The reasons for doing so were that it was thought the country was now fairly supplied with stud stock, and that the farmers were in a much better position to obtain sires than they were when the farms were started. It was also thought that the breeding of stud stock on a large scale by the Government would unduly interfere with private enterprise and discourage the breeders of pure-bred stock, who have lately become numerous and are devoting a large amount of capital and skill to their business, and for various reasons are probably able to breed stock better and more economically than the Government could. Further, the farms which are confined to the Transvaal and Orange Free State were costly to maintain, and to keep them on and to establish others in the Cape and Natal, which would be necessary if the Union were to be treated alike, would have involved the expenditure of more money than was considered justifiable at the present time. But though the farms are being closed, it is to be hoped that the importance of assisting farmers to obtain suitable sires will not be lost sight of, as it is one of the best means of improving the live stock of a country, and is particularly necessary in the case of horses, and the granting of premiums for approved pure-bred sires, the formation of societies for the purchase or hire of sires, etc., should be considered as opportunity offers. The registration of stallions and the elimination of unsound horses and of unsuitable sires generally have been discussed. It would undoubtedly be a good thing if no stallions suffering from hereditary disease were allowed to be used, but for the Government to decide what sires were or were not of sufficient merit to warrant them being used, would be most difficult, and the cost of administration in a vast and thinly populated country like this would be much higher than in Europe or in many of the Colonies where the farmers are closely settled on small farms.

Heavy horses are beginning to be worked on the land, which is a welcome sign, as history shows that the use of horses for light work on the land has usually marked an era in the development of a country, and it is hoped it will do so here. Heavy horses on the farm will also mean the production of mares suitable for breeding mules and the useful type of light draught horse which is such a feature in most countries.

Despite the heavy losses caused by the drought and the slump in ostrich feathers and the difficulty of disposing of tobacco, which severely affected many farmers, agriculture is progressing, and to-day the farming industry is in a very different position in every respect to what it was 10 years ago.

Although there is still a very great deal to be learned about the country from an agricultural point of view, yet, thanks to the experience gained by practical men and to the investigations conducted by the Department, our knowledge of it is greater than it was and is increasing.

On account of the information that has been acquired, and the more complete organisation and equipment of the Department, many of the diseases of live stock that proved an almost insuperable barrier to progress in certain parts of the country, and greatly handicapped the whole of it, have been eradicated or controlled, and there are good grounds for believing that others that are still troublesome will be successfully dealt with before long.

Since 1902 a vast amount of money and energy has been expended by the Government and the farmers in developing the country or removing obstacles



to progress and in rendering it possible for farmers to pursue their calling more securely, economically and profitably.

The Departments of Agriculture, Lands, Irrigation and Water Supply, Forestry and the Land Bank have been established or elaborated, as the case may be; agricultural colleges and experimental stations have been established, the country schools have been increased, and the facilities for educating and advising the farmers and generally for promoting their interests have been vastly improved. Irrigation works have been carried out, and railways, roads and bridges constructed, and the postal, telegraphic and telephonic service extended and improved; freights by land and sea for agricultural produce and supplies have been reduced and free carriage has been secured for pure-bred live stock imported from Europe, and market and export facilities have been greatly improved.

The unification of the four colonies has assisted agriculture in many ways, amongst others by enabling the artificial boundaries that previously existed between the various colonies to be abolished and uniformity of legislation and of administration to be instituted throughout the country. The legislation most material to the farmers, such as the acts dealing with Diseases of Live Stock and Plants, Fencing, Irrigation and Water Supply, has been consolidated and brought up to date and is probably as good if not in advance of that of any other country.

A change is also coming over the farmers; they are giving more thought and attention to their business, and the more progressive of them, of whom fortunately there is a good number distributed throughout the country, are attaining a good standard in the management of their business and are setting a good example to their neighbours. Whereas a short time ago, except in a few districts, fencing was scarce, it is now common; not only are the majority of the farms fenced, but many of them are paddocked; dams, bore-holes and irrigation furrows, farm buildings and other permanent improvements are being carried out, and live stock is increasing in number and improving in quality. More care is being taken in the cultivation of the crops and in the management of live stock, and though unfortunately there are still many backward farmers and much undeveloped land and great scope for improvement, yet it may safely be asserted that there are few if any farms occupied by white men on which some improvements have not been made. Besides the improvements the farmers are effecting on their farms they are beginning to realise the necessity for organisation and collective effort, and are taking steps to promote their interests by means of agricultural unions, co-operative societies, breed societies, and so forth, and the Agricultural Shows, in which the inhabitants of the towns have greatly assisted, have improved wonderfully of late and are doing much to educate and stimulate the farmers.

Reference has been made to the improvement of the agricultural press elsewhere in this report.

Reference could be made to many other factors affecting the agricultural situation, but enough has been said to indicate the advance that has been made and to show that the industry is on a very different footing now to what it was a short time ago.

I have the honour to be, Sir,

Your obedient servant,

F. B. SMITH,

Secretary for Agriculture.





## APPENDIX I.

## VETERINARY DIVISION.

ANNUAL REPORT, 1913-14.

Pretoria,

10th August, 1914.

The Secretary for Agriculture.

I have the honour to submit herewith my Annual Report for the year ended 31st March, 1914.

As East Coast Fever is still the most important disease with which this Division is called upon to cope, I will outline the position briefly with regard thereto before proceeding to discuss other matters with which we are concerned.

## EAST COAST FEVER.

*Cape Province.*—In this Province work of a most strenuous character has led to a material check in the progress of the disease, and in both East London and Kingwilliamstown Districts the improvement in the position is most marked. It must not be inferred, however, from these preliminary remarks that we have had no set-backs, but, compared with the progress made and the work which has been accomplished, these are of minor importance.

At the end of March, 1913, the prospects of holding the disease in check were not too promising, as the Commonage of East London had then become infected, the disease had spread considerably in Ward 7, and in Ward 3 several farms had become infected which adjoined the original centre on Farm No. 63. The position demanded the personal attention of a Senior Officer and Mr. Dixon, Senior Veterinary Officer, was sent to East London to take up his headquarters there, in order that he might be better able to gauge the requirements of the situation in the two infected Districts; and from March to September the greater part of his time was given to this work, assisted by two Veterinary Surgeons and a small staff of Stock Inspectors and Special Police. Particular attention was paid to the dipping and hand-dressing of all cattle running on the various infected areas: a central dipping tank was constructed at Government expense in the original infected area, at Paardekraal, East London Division, and the cattle belonging to residents thereon and those belonging to farmers on adjacent infected areas, who could not—or would not—provide themselves with dipping facilities, were concentrated at the Government tank, where they were dipped in a five-day dip and hand-dressed under the supervision of the Government. As a result of these measures the activity of the disease has been checked, and already we are in so satisfactory a position that four farms in East London Division are now due to come out of quarantine; three more should come out at the end of April and, if all goes well, three more will be clean at the end of June: and, when I mention that only ten animals out of 2,951 have died on the East London and adjacent Commonages of Amalinda and Cambridge, which are infected with the disease, and that the last death occurred thereon in March, 1914, those who have had experience in dealing with East Coast Fever will admit that the work taken in hand by the Department has been carried out with a good deal of thoroughness.

In Kingwilliamstown a campaign of a similar arduous character has been conducted, under Senior Veterinary Surgeon Dixon's direction, by Government Veterinary Surgeon Nicol with the assistance of Mr. Gilfillan, Assistant Resident Magistrate, Kingwilliamstown, who has been indefatigable in his efforts to bring the Native community, amongst whose cattle the disease originally appeared, into line with our requirements, and the success which has attended their labours has been most noteworthy. In March, 1913, four Native Locations, densely stocked with cattle, were infected with East Coast Fever and under quarantine,

the disease being then active in the Mount Coke Locations, and an outbreak which occurred at Blaney in February, 1913, gave considerable anxiety when it was first discovered on account of the length of time which elapsed before the existence of the disease was recognised. The infected Locations were, however, fenced and dipping and hand-dressing of all cattle within the area enclosed was vigorously carried out and at the present time the disease can only be regarded as active on Putus Location, in which 20 deaths have occurred. In the adjacent Location, belonging to Malakalaka, there have only been four deaths in all, the last in June: there was one in Fakus Location in April last; the other Location, Ntantisos Location, is now due to come out of quarantine; and at Blaney dipping was carried out with such thoroughness that within a month of the enforcement of short interval dipping mortality ceased, the last case occurring in March, 1913.

In spite of the success attending cleaning up operations in the Kingwilliamstown District generally the disease unaccountably made its appearance on the Commonage of Kingwilliamstown, where one animal died, the case being one of a typical character. As a precautionary measure, the Town and Town Lands were closed to movements of cattle, thereby creating a situation which threatened to be one of great hardship to a large number of small farmers residing in the vicinity, who depended entirely upon the Kingwilliamstown market and merchants for the disposal of their produce and who were unprovided with any other means of transport than oxen. The position having been represented to the Department, I visited the town in company with Senior Veterinary Surgeon Dixon, in order to ascertain whether there was any way of overcoming the difficulties attending the situation, and, as it appeared that the roads leading into town were of such a character that their fencing was practicable, it was suggested to the Municipal Authorities that if they could see their way to fence the roads traversing the Commonage, from the point where these roads entered the Town Lands to where the streets proper began, ox transport might be admitted into town, provided the owners of the animals were prepared to conform to our requirements about keeping their cattle tick-free and were prepared to enter and leave the town without outspanning. The Municipal Authorities rose to the occasion and acted with great promptitude, erecting the necessary fencing in the course of a few days, thereby enabling the Department to relax the restrictions to the extent indicated, and since that time bovine transport has been allowed to enter and leave Kingwilliamstown without the occurrence of any untoward incident.

Although the work done in East London and Kingwilliamstown has been very satisfactory, I regret to say that the Cape Province is now menaced with invasion at other points, as in October last year East Coast Fever made its appearance on Gubenxa Commonage in the Elliot District in close proximity to Native Territory, here one animal developed the disease but there has been no further mortality, and dipping tanks have been established within the infected area at which the cattle in the locality are being dipped. Later, another outbreak of the disease occurred at the farm Arisaig in the same District in December, and from this point the infection speedily spread to four other farms all tenanted by Natives. In this instance the source of infection was clearly traced, as the original owner amongst whose cattle the disease broke out, and who had animals suffering from the disease in Native Territory adjacent to the farm Arisaig, undertook to inoculate his cattle with material taken from an infected animal, having apparently gained some insight into our methods of inoculation as practised in Native Territory. In consequence of these experiments by this Native, the disease broke out amongst his animals, and as no tank was available the mortality was very considerable before one could be erected, but it is now in working order and the cattle surviving are being dipped under European supervision; while, on the neighbouring farm to which the infection extended, other tanks have also been built, so that all cattle in this centre are now receiving proper attention.

This completes the tale of East Coast Fever outbreaks in the Cape Province, and for further particulars the reader is referred to the tabular returns contained in Appendix "A" attached to this report; but, although we have not, so far, any reason to complain of the lack of success attending our efforts to keep the disease in hand, the Cape Province is still in a most precarious position, and with an extensive Native area in which the disease is prevalent, lying along its border, stockowners in these Districts adjacent to the Transkei should avail themselves of the present days of grace to equip themselves with dipping tanks and to begin dipping operations, as it is expecting too much to assume that no further outbreaks are likely to occur; while they would also be well advised to restrict movements of cattle for transport purposes as much as possible.



*Transvaal.*—In this Province, except in the case of the District of Piet Retief, considerable progress has been made in the eradication of this disease.

Why Piet Retief is in such a backward condition it is, perhaps, difficult to say, unless it is on account of the proximity of the District to Swaziland, in which infection still exists near the borders, or to the disregard of the restrictions placed upon the movement of cattle by individual owners and the unauthorised and illicit movement of stock in and around infected areas. Whatever the cause may be, it can at least be said that the situation is such as might be expected to arise in a District in which local farmers as a whole were not in sympathy with the efforts of the Department to stay the spread of the disease and are impatient of restraint, otherwise more progress should have been made in a District which is so thoroughly patrolled by a staff of Special Police, who are engaged in supervising dipping operations and making enquiry with regard to mortality amongst stock.

During the year quarantine has been withdrawn from all infected farms in the Districts of Barberton, Pretoria, Rustenburg, Lydenburg and Waterberg, while only one farm remains in quarantine in the District of Carolina, six in the Districts of Zoutpansberg and Pietersburg, formerly dealt with as one District, and nineteen in the District of Piet Retief.

Forty-one farms have been removed from quarantine during the year and there have been only fourteen fresh outbreaks. One of these, the outbreak on Volksrust Town Lands, caused some anxiety, as the appearance of the disease could not be accounted for and it threatened to interfere materially with the development and prosperity of the District, as it became necessary to close the town to ox transport. The Municipal Authorities, however, on being approached, agreed to fence all roads leading into town and when these fences were erected ox transport was resumed, and, as no further cases have followed the original one and all cattle on the Town Lands are being regularly dipped there are good reasons for hoping the disease has been nipped in the bud. One encouraging feature of the position is the amount of attention which has been paid to Departmental recommendations respecting the erection of dipping tanks. This is particularly the case in the Districts of Barberton, Lydenburg and Pietersburg-Zoutpansberg, in all of which the Resident Magistrates have strenuously supported the policy of the Department, and in which a considerable number of cattle dipping tanks have been erected and are being used, both by Europeans and Natives, with very gratifying results (for details, see Appendix), and it is quite within the bounds of possibility that there may be recrudescences of the disease in areas from which restrictions have been recently withdrawn in the expectation that they are clean. It looks at the moment as if there is some reason to hope that the worst is past, although long experience with the vagaries of East Coast Fever does not dispose one to be optimistic.

*Natal.*—In Natal the work of stamping out East Coast Fever is proceeding slowly, but on the whole in a satisfactory manner.

During the year ending 31st March, 1914, there have been seventy-six fresh outbreaks of this disease as compared with 213 outbreaks last year, and in commenting upon the position Senior Veterinary Surgeon Power expresses the opinion that in some instances these so-called fresh outbreaks do not represent fresh infections of clean areas, but are simply instances in which the disease has been smouldering since it first broke out some years ago. This is particularly likely in areas in outlying portions of Districts which are only occupied by Native tenants, as occasional deaths occurring amongst Native cattle are not invariably reported to the Authorities, and where there are a comparatively small number of susceptible cattle grazing over a large area such cases of disease may easily be overlooked.

In some Districts rapid progress is being made in cleaning up, especially in some of the Northern Districts. In Dundee there have been no fresh outbreaks reported and only seven farms remain in quarantine, 25 farms having become clean during the past year; while in Helpmakaar—leaving the Location in which the disease is still active out of consideration—there has been one fresh outbreak, and only one farm is now in quarantine. In Vryheid, formerly a very backward District, seven farms have been taken out of quarantine, five fresh outbreaks have occurred and twenty-three farms are still in quarantine. There has been considerable activity displayed in the construction of tanks in this District, fifty-nine having been built during the year, bringing the total number up to 111. One of the disabilities under which this District has laboured in the past through the existence of infection on farms belonging to non-resident owners upon whom no pressure could previously be brought to bear to compel

them to erect tanks on their holdings, has now been overcome by the exercise of powers obtained by the Minister of Agriculture during last Session, whereby such owners can now be served with Notices requiring them to construct tanks within a specified period, and, in the event of their failing to do so, tanks can be erected on their farms by Government at their expense. It is hardly necessary to say that the service of such notices, sixteen in all in this District, has not given unqualified satisfaction to absentee owners, but resident farmers have expressed their appreciation of the action taken by the Government, and there is no doubt that the campaign now being conducted against absentee owners of infected farms in all parts of Natal is calculated to expedite the work of getting rid of the disease; in many places, indeed, farmers are showing a disposition to urge the Department to go one better and make it a condition generally that owners of farms, even if these farms are clean, should be compelled by law to provide facilities for the dipping of any cattle running thereon. That this is desirable admits of no question, but for the present I am of opinion the Department is well advised to devote their attention to infected farms and to press for the erection of tanks thereon as a preliminary to dealing with the matter on a larger scale, as, if this were attempted at the present moment, we might lose sight of the weak spots in our line of defence, *i.e.*, the infected un-tanked farms, where dipping operations are more necessary than they are on those farms upon which the disease does not exist.

In Vryheid and in Zululand, where the use of salted cattle has been permitted for transport purposes, several accidents have occurred lately through the breaking down of the immunity of animals which were believed to have recovered from East Coast Fever. In some cases these animals trekked out of infected areas and broke down in clean ones, with the result that fresh centres of infection have been established, to the serious embarrassment of owners and adjoining farmers. There is, of course, always a possibility that some of these animals had not had the disease before but had merely escaped infection on previous occasions, but at the same time there is no doubt that the immunity conferred by one attack of East Coast Fever cannot always be depended upon to last for an indefinite period, and for that reason the use of salted cattle for transport purposes in and out of infected areas is always attended by considerable risk, and it is desirable in the interests of everyone that when a District is becoming freed from East Coast Fever by the use of dipping tanks and other precautionary measures, the movements of these salted animals should be restricted as much as possible, and that the conditions under which they are permitted to work should be gradually tightened up till such time as susceptible and salted cattle are required to conform to the same rules.

In Ngotshe District there have been eleven fresh outbreaks during the year and there are still twenty-four farms in quarantine, while the number of dipping tanks erected in the District is only fifty. The position here is not satisfactory, largely owing to the isolated position of many farms, the presence of a Native population and the lack of European residents, but the erection of dipping tanks on infected farms belonging to absentee owners is being pressed, and there is little doubt that we will ultimately succeed in checking the disease effectively.

In Paulpietersberg District most of the farms in European occupation are now provided with dipping tanks. Here, as in Ngotshe, there are unfortunately a large number of farms occupied only by Natives and many of them in unhealthy parts of the country. The disease is still smouldering in this District, but pressure is now being brought to bear on the absentee owners to whom these farms belong, and we expect before long to have all infected farms provided with tanks, when we will be able to carry out dipping more thoroughly.

Newcastle District is now making satisfactory progress in the direction of suppressing East Coast Fever. On the 1st April, 1913, there were fifteen areas under quarantine, and at the end of the current year there are only nine, most of which are due to come out of quarantine in about two months' time, and, as all infected areas are fenced and have dipping tanks, we may reasonably hope that this Division will presently become clean.

In Ladysmith and Bergville Divisions our main difficulty in coping with the disease is, again, the absentee landowner whose farm is occupied by Natives and infected with disease. All absentee owners in these Divisions have been warned to erect tanks; many have done so, and in the case of those who have not, final warnings have been sent out, and if these are disregarded the Department will then proceed to erect tanks at the expense of the owner. Many extensive areas in these Districts, however, have now become clean, and in these movements of cattle are freely permitted, but complaints are still heard occasion-



ally from farmers in outlying portions of these Districts that their communication with the railway line and other business centres is still cut off by infected farms lying across the main roads.

In Estcourt, Weenen, Lions River and Impendhile respectively there are thirteen, six, four and one farm in quarantine for East Coast Fever, but Government Veterinary Surgeon Webb, in whose District these Divisions lie, has been paying a good deal of attention to making arrangements for the satisfactory dipping of all cattle on these farms, with an encouraging amount of success.

In Umvoti, Kranskop, New Hanover, Pietermaritzburg, Camperdown and Richmond Districts there are now very few centres of disease which are giving cause for much anxiety, except in the vicinity of Pietermaritzburg Town Lands, around which there have been five fresh outbreaks during the year, mostly amongst small lots of cattle.

On the north coast there have been two fresh centres of disease established, in one instance, in a clean area in Lower Tugela, in which the source of infection has not been ascertained; while in the other the outbreak occurred on the clean farm of a farmer in the Inanda Division, who is also the owner of another infected farm in the same District.

In the Divisions of Polela and Ixopo Senior Veterinary Surgeon Power states progress is being made in the eradication of the disease. In Ixopo the position still requires careful handling; while in the southern part of the Province, in the Alexandra, Lower Umzimkulu and Alfred Divisions there are good grounds for saying matters are not so satisfactory. By this it must not be inferred that a large section of the community are not doing their best to keep their farms clean and that their efforts are not successful to a very marked degree, but in these Divisions there is a considerable area of low country occupied by half castes, Indians, Natives, and, in some cases, by a poor class of European, who are at all times very difficult to deal with; and in the large Native Locations in these parts dipping facilities have only recently been provided, and sufficient time has not yet elapsed to permit of things being got into proper working order.

Of all areas in Natal, however, Zululand is the one presenting the greatest difficulties so far as the control and suppression of disease are concerned, as, when a large area like Zululand occupied by Natives has become thoroughly contaminated it is exceedingly difficult to determine whether any particular portion thereof has become clean by lapse of time or whether the disease is still smouldering there, kept alive by occasional deaths amongst the susceptible progeny of the immune animals which have survived the first invasion; added to these, the use of immune animals for transport purposes has also contributed to the uncertainty of the position, and there is little doubt that for a very considerable period Zululand will remain a menace to the European farmers resident on its border and in those parts of the territory recently thrown open for European settlement. Steps have been taken, however, to provide dipping facilities for Natives, especially in those parts of Zululand lying nearest the European settlements, and dipping has been preached to Natives as a means whereby they will clean their country and will ultimately be in a position to re-stock it. Lack of adequate funds to carry out this policy in a sufficiently thorough manner simultaneously throughout the infected area, however, must necessarily militate considerably against the successful prosecution of a dipping campaign, but a start has been made with this work, and if a measure of success is obtained in the areas in which it has been begun it will doubtless encourage the Native to make further efforts to work out his own salvation. My own view of the position, however, is that it would be a profitable investment to expend a larger amount of public money in dealing with this very important matter, as parsimony may spell failure, and if, by our efforts, we only succeed in convincing the Native that we are unable to stamp out the disease in those areas in which the work is begun, we may look for a good deal of opposition, both active and passive, to the extension of the policy to areas more remote.

Another point calling for consideration is the absence of any definite policy for the erection of dipping tanks and the dipping of cattle belonging to Native owners residing outside of Native Locations on the Crown Lands, which form so large a portion of Zululand.

In those parts of Zululand in which the Native Affairs Department have made a start with the dipping of Native cattle this difficulty does not exist, as most of the Crown Lands have been taken up by Europeans, who in their own interests are seeing to the dipping of their cattle, but when we go further afield and begin work in those parts of Zululand in which the Crown Lands have not



been taken up, the question of providing dipping tanks and supervision for Native cattle on Crown Lands is one which must be faced, and can only be dealt with in a satisfactory manner by the expenditure of public money for this purpose.

In preparing for the work of dipping Native cattle in various Locations throughout Natal, the Native Affairs Department have already erected about 250 tanks, thereby bringing the approximate total of cattle dipping tanks erected in Natal to about 3,000.

*Transkei.*—The problem of dealing with East Coast Fever in an infected area like the Transkei, over sixteen thousand square miles in extent and occupied by a Native population, is obviously formidable, and during the past year the small staff working in this Territory, under the supervision of Senior Veterinary Surgeon Spreull, has been hard put to it to cope with the situation, much of their work being carried out under very unfavourable conditions.

During 1914 there have been 150 outbreaks of East Coast Fever, only two-fifths of the number met with during the previous twelve months, and this falling off has been due, not so much to any check which the disease has sustained in consequence of the operations conducted against it, but rather to the lack of new worlds to conquer, as almost the whole of the low-lying and coastal districts in the Transkei have been overrun with the disease. There it spread with great rapidity, and is now making more tardy progress in those parts of the Native Territory where the altitude is greater and where tick life is less abundant and conditions are less favourable for the spread of infection, but it is only in those parts of the Transkei occupied by an European farming population that the work of combating its spread is being carried out with such a degree of thoroughness as to give grounds for hoping its progress will be stayed.

From this it must not be inferred that nothing is being done in purely Native areas to hold the disease back and to stamp it out, as all through the Native Territories the erection of dipping tanks by the Transkeian Territories General Council is going steadily on. Already the Districts of Mount Fletcher, Matatiele and Qumbu are completely tanked and many other Districts have been supplied with half the necessary complement, and, although by inoculation large numbers of cattle have been saved which would otherwise have succumbed to the disease, it is undoubtedly to the dipping tank we will have to look for the cleaning up of the Territory, and this is not likely to come to pass until the number of tanks is materially increased and a thorough and systematic dipping campaign can be inaugurated and carried out.

Meanwhile, the various Magistrates, with the assistance of the small veterinary staff now stationed in the Territories working under the direction of Senior Veterinary Surgeon Spreull, are consistently fighting the disease to the best of their ability: cattle are being dipped where facilities are available for doing so, and everywhere cattle movements are being controlled, and in some parts cattle are being inoculated. Inoculation operations have now slackened off considerably, however, as in most areas in which the disease progressed rapidly a considerable number of Natives have already availed themselves of the opportunities offered them for immunising their animals, and now that the disease has invaded those parts where it progresses more slowly Natives do not quickly realise the necessity for subjecting their animals to a process of inoculation, which involves the loss of a very considerable proportion of the cattle subjected to it. In fifteen Districts cattle have been inoculated by the veterinary staff, but only in seven of these have Natives resorted to inoculation to any great extent. During the year the number of animals inoculated has been 67,960, bringing the total number of animals treated by the staff up to the more than respectable figure of 275,512. I am of opinion, however, that the time is now approaching when this form of treatment should be discontinued and Native cattle owners should be compelled to depend upon their dipping tanks to work out their salvation.

In the earlier days of the invasion of the Transkei by East Coast Fever there were many excellent reasons for inaugurating a system of immunisation which, crude though it was, enabled owners of transport animals to keep them on the road and supply the needs of the Native and European population, but with nearly a quarter of a million head of immunised cattle in the country it cannot be argued that there is any longer any necessity for adding to their number, particularly when it must be borne in mind that these immunised cattle will most certainly add to our difficulties when the time arrives for cleaning up, as the progeny of immune cattle will everywhere tend to perpetuate

veld infection and render the eradication of the disease more difficult. Even if this work is discontinued in the future, and the Native is, so to speak, brought to the dipping tank and invited to dip his animals, much will have to be done before he can be convinced of the necessity for doing so, as there is no room for doubt that the majority of Natives have no idea as to how this disease is spread. That the disease is disseminated by ticks the Native does not believe and, while it may be possible to satisfy him that the dipping of susceptible cattle protects them in some way against disease, when he is informed that in order to stamp out the disease and prevent its future recurrence it is necessary to dip his salted cattle as well, he is naturally incredulous and cannot see that the dipping of animals which have once had the disease and are not likely to get it again can be beneficial to anyone. Dipping certainly does not improve the working capacity of transport cattle, a point which he regards as being of considerable moment, and how the dipping of such immunised animals can do any good to those cattle who have not yet been attacked by the disease he is unable to understand. Memories of Rinderpest experiences also prejudice him against listening to warnings of the impossibility of re-stocking at an early date on account of the long persistence of veld infection, and no amount of preaching will convince the average Native who saw Rinderpest sweep through these Territories nearly twenty years ago, that the purchase of cattle and their introduction into an area in which no deaths have occurred for several months is likely to be followed by loss until he has tried it, and as a consequence Natives and unscrupulous Europeans have come forward to supply the demands which have sprung up at various times for raw cattle in old infected areas, by the illicit movement of susceptible cattle, with very unsatisfactory results so far as their customers have been concerned.

This picture of the position in Native Territories is a gloomy one, but it has a bright side, and that is manifest when we turn from those areas occupied chiefly by Natives to those held by Europeans. Here the situation is very different, as almost all farms are fenced and the majority of farmers have either got dipping tanks of their own or have an interest in a joint tank erected near the boundary of two or more holdings, with the result that if East Coast Fever does happen to make its appearance on their farm it is speedily checked and is soon stamped out. This is notably the case in the Mount Currie District, in which there have been five outbreaks of East Coast Fever during the past year, with a mortality of only twenty-seven head, and on many of the infected farms the disease has been checked with the loss of only a single animal.

The foregoing remarks indicate briefly the position of the Union as regards this most important disease, but before passing on to the consideration of other subjects there is one point to which public attention should be most particularly directed. This is a matter affecting those parts of the Union to which East Coast Fever is still a stranger. The idea is still held by many farmers in certain parts of the Union remote from infection that there is something so remarkable about the climatic or local conditions in these favoured localities, that if the disease by any extraordinary accident should be introduced it would not live and would speedily "die out," and on that account preparations to fight it are unnecessary and the construction of dipping tanks for that purpose is a simple waste of money. Now, it may be accepted without any hesitation that wherever there are ticks, even in small numbers, tick borne diseases may obtain a footing at any time and give rise to serious loss, that there are few, if any, localities in which East Coast Fever would not be likely to establish itself, and it is, therefore, incumbent upon every progressive farmer to provide himself with a cattle dipping tank and to dip his cattle therein. These remarks apply with particular emphasis to the Free State, to certain Districts of the Transvaal and to the Cape Province, in many parts of which ticks are both abundant and troublesome, and where to-day cattle dipping tanks are remarkable only for their scarcity.

Detailed returns in tabular form, giving particulars of interest in connection with East Coast Fever, will be found at the end of this report.

#### TUBERCULOSIS.

Before proceeding to review the situation in the various Provinces with respect to this disease, I may say it has been a matter of the greatest regret to me that it has not been found possible to amend the compensation schedule attached to the Stock Diseases Act, in order to permit of the payment of more liberal compensation to the owners of cattle re-acting to the tuberculin test,



and that, for financial reasons, no special sum is being placed on the Estimates for the forthcoming year to enable us to make some attempt to ascertain to what extent the disease is prevalent throughout the Union.

I have mentioned these matters together, as the success of our investigations depends entirely upon the amount of assistance the stock-owners can be expected to give the Department, and this assistance can only be expected if some inducement is given to them to come forward and help us in the public interest. How much the delay in tackling this most important problem may yet cost the country it is impossible to estimate, but if the stock-owners of the country realised how rapidly the time is passing during which an effort might be made to cope with this disease, and how near we are to the hour when this will become impossible and when cattle-owners may reckon on having one-third of their cattle infected with this disease, I feel certain they would display more interest in the matter.

It needs no prophetic eye to forecast the result of procrastination. Tuberculosis is not a disease which dies out: it is here now, and unless dealt with it will, and must, spread in spite of the arguments of those who profess to believe that the climatic conditions are unfavourable for its doing so. It may not, it is true, extend with the same rapidity that it does elsewhere, but the increase in the percentage of re-acting animals found by our officers in the course of their testing operations in the closed area in the Cape Peninsula is a warning which no thoughtful stock-owner is likely to disregard.

Last year the percentage of re-acting animals was 2.35 per cent.; this year it has risen to 4.87—these are figures which can be left to speak for themselves; and with the rapidly changing conditions in this country, which point to a time not very far distant when South Africa should become a country given up largely to dairy farming, particularly in the coastal areas, the weight of this handicap to the farmer will become more evident every year.

If the present position is such that we can yet afford to grasp this nettle, and we do so and take rational steps to keep this disease under control, our comparative freedom from Tuberculosis would give South African dairy farmers an immense advantage in the markets of the world over their less fortunate neighbours; while, on the other hand, if nothing is done, the uncertainty of the present position will serve as a deterrent to those who desire to improve their property by going in for this class of farming, and the more enterprising who do so will purchase their experience dearly.

An enquiry into the state of our dairy herds should be set afoot without delay. Railway extensions can wait, the erection of public buildings may be put off without causing more than temporary inconvenience, but this matter is not one which can be taken up with the same facility a few years hence as it can be to-day, and if stock-owners generally realised how very important this matter is and how much the interest of each individual is affected thereby, I am satisfied that the funds would speedily be forthcoming to test our position.

At the present moment much uneasiness is evinced in farming circles regarding the prevalence of Gal Lamziekte, but it does not appear to be generally known that Tuberculosis is an even more serious scourge than Gal Lamziekte, as the latter at all events does not affect human beings, while the former does, especially in early childhood. The question of the transmissibility of Tuberculosis from animals to human beings, and *vice versa*, is one which scientists have fought over at great length. Eminent pathologists have taken their place on both sides, but at the present day the weight of evidence is in favour of those who favour the theory of communicability, and although it would appear that adults are not highly susceptible to the bovine strain of the bacillus of Tuberculosis, the testimony of those who point to the serious results of the infection of children through the use of milk from cows suffering from Tuberculosis is unassailable.

#### IMPORTED CATTLE AND TUBERCULOSIS.

Imported cattle to the number of 1,894 have been subjected to the Tuberculin test during the present year. Of this number, seventy-two, or 3.80 per cent., have re-acted to the test and have been destroyed in conformity with the provisions of the Act. The greater number of these animals came from Great Britain. Most of them were tested immediately prior to shipment, and the re-actors can be divided roughly into two classes; one in which the lesions were of a trifling character, probably indicating that many were in the incubative stage of the disease when tested before despatch for Africa, or had become immune to the test made before embarkation by reason of their having been



tested on more than one occasion before sale; while in the second class of re-actors the lesions were of long standing, and on this account they may have failed to re-act to the original test.

The present arrangements made for applying the test cannot be regarded as very satisfactory from a scientific or administrative point of view, as, although it may suit the convenience of an importer to allow him to take his oversea cattle direct to his farm and to isolate them there for test, many men have very primitive ideas of how animals should be effectively isolated, while the changed conditions to which imported animals are subjected in the way of food and housing and their exposure to tick infestation frequently induce irregularities of temperature which render the diagnosis of Tuberculosis, from a consideration of the temperature reaction, exceedingly difficult, and the amount of time lost by our officers in travelling to remote parts of the Colony, often more than once, for the purpose of applying the test, render the present system an extravagant and unsatisfactory one. For these reasons it now becomes a question whether we should not detain all imported animals at ports of entry till they can be tested there, until such time as the Law is amended to permit of this test being carried out oversea.

*Cape Province.*—In the Cape Province Senior Veterinary Surgeon Dixon expresses the opinion that until the systematic testing of the dairy herds in the Cape Peninsula is taken in hand we cannot hope to make any headway.

Last year, out of 4,000 head tested in the Districts of the Cape, the Paarl, Malmesbury and Stellenbosch, there were 2.35 re-actors; this year, out of 4,307 head there were 4.87.

During the year a somewhat elaborate series of experiments with the various forms of the Tuberculin test have been carried out by Government Veterinary Surgeon Jowett, of the Cape Veterinary Staff, which have added considerably to our knowledge regarding the comparative value of the various methods of using this re-agent.

*Transvaal.*—In the Transvaal the number of outbreaks of this disease, with which our officers have been called upon to deal, has increased. In 1912 we dealt with 16 outbreaks, in the course of which 18 cattle died or were destroyed and 81 in-contacts were tested. In 1913-14, 48 outbreaks came to our notice, and in handling these 132 died from the disease and 1,289 head were tested, of which 126 re-acted and were slaughtered with the consent of the owners.

The increase in the number of outbreaks dealt with is, in Senior Veterinary Surgeon Christy's opinion, due to the fact that more outbreaks were reported by owners, which enabled us to follow up in-contacts and in this way deal with other outbreaks, while the information received from officers in charge of abattoirs in Johannesburg, Krugersdorp, Germiston and Pretoria has had not a little to do with our increased activity in dealing with this disease.

*Natal.*—During the current year five outbreaks of Tuberculosis have been dealt with in Natal, in the course of which 131 animals were tested and 14 re-acted to test.

There have been fewer applications made by stock-owners for the testing of their animals than last year. This is attributed to the expectation that the rate of compensation would be presently increased, and owners of herds who wish to have their animals tested have been waiting in the hope of receiving higher compensation for their animals in the event of any being found to re-act to test and arrangements being made for their destruction.

*Transkei.*—Lesions of Tuberculosis were discovered in the carcase of one ox slaughtered at the Point, Durban, which was said to have come from the farm "Bloemfontein" in the Mount Currie District. The in-contact cattle, thirty in number, were tested with Tuberculin with negative results. During the year 55 cattle were imported into the Transkei from oversea, of which two re-acted and were destroyed.

*Orange Free State.*—No outbreaks of Tuberculosis were reported by cattle owners in the Orange Free State to the Department, but endeavours were made to trace the in-contacts with 28 cases of Tuberculosis reported by the Director of Municipal Abattoirs, Johannesburg, as having been found amongst cattle coming from the Orange Free State. In five cases the herds were located from which these cattle had come and 19 in-contacts were tested with negative results; and in one other instance a herd of 32 head was tested on account of the suspected existence of disease therein, with the result that eight re-actors were located, branded and isolated.

In addition to these, the discovery of tuberculosis lesions in 62 pigs coming from the Orange Free State was also reported by the Director of Municipal Abattoirs, Johannesburg, but in none of these cases was it possible to determine whence these animals had come, but many were, undoubtedly, purchased from Natives.

#### ANTHRAX.

There is no doubt whatever that outbreaks of Anthrax are becoming more common every year in all parts of the Union, and in some localities this disease is now becoming such a scourge that in time to come, unless general inoculation is carried out regularly, losses from this disease will be very heavy. Many stock-owners are beginning to recognise this and the demand for Anthrax vaccine has gone up lately by leaps and bounds, but unfortunately the use of this preparation has sometimes been attended by very unsatisfactory results, as within six weeks the disease has re-appeared in infected herds. As you are aware all Anthrax vaccine distributed by the Department is obtained from the Institute Pasteur, and recent representations which have been made to that Institute have now led those in charge to undertake the preparation of a special vaccine for use in this country. Consignments of this vaccine are now coming to hand, but it is too soon to express an opinion as to its efficacy.

From a consideration of the Cape Anthrax returns I am satisfied that outbreaks of this disease are very rarely reported to the authorities, while the Senior Veterinary Officer expresses the opinion that in Native areas probably more animals die from this disease than from any other.

*Cape.*—In the Cape no fewer than 577 outbreaks of Anthrax have been reported and dealt with, as compared with 197 last year. In the course of these 710 animals have died and 10,374 in-contacts have been dealt with; but what excites suspicion that the disease is much more prevalent than is generally believed to be the case, is the circumstance that of this number of outbreaks 436 occurred in the Divisions of East London and Kingwilliamstown, in both of which Districts it is customary to collect blood smears from all animals dying suddenly and examine them microscopically to make certain that death has not been due to East Coast Fever, and I have no-doubt that if a similar line of action were followed in other Districts we would find that the position in other Districts is in all probability much the same as it is in the two which I have mentioned.

*Transvaal.*—In this Province the Senior Veterinary Surgeon reports that Anthrax may be regarded as prevalent in Pretoria, the Witwatersrand, Krugersdorp, Potchefstroom, Lichtenburg and Marico, and that sporadic cases occur in most of the other Districts in the Transvaal, but I may say I am inclined to believe that if we were more fully informed we would probably find that some of the other Districts are no better off than those placed in the first category.

Last year 34 outbreaks were reported, in which 111 animals died or were destroyed, while 310 in-contacts were inoculated; while this year there have been 241 outbreaks, 373 deaths and 15,221 in-contact animals have been inoculated.

*Natal.*—In Natal 25 outbreaks of Anthrax have been dealt with, but no record has been kept of the number of animals which have died or the number which have been inoculated. Last year the number of outbreaks dealt with was 11.

*Transkei.*—In Native Territories 106 outbreaks of Anthrax have come to our notice, in the course of which 251 head have died and 3,313 in-contacts have been dealt with. Compared with last year, when there were 119, the number of outbreaks show a slight falling off, but this is attributed by the Senior Veterinary Surgeon to the smaller number of blood slides sent in for examination as compared with the number submitted last year, rather than to any slacking off in the prevalence of the disease. In the Engcobo District, in consequence of an outbreak of Anthrax amongst horses in the course of which several died, a large number of Natives have had their horses inoculated against this disease.

*Orange Free State.*—The outbreaks of Anthrax dealt with in the Orange Free State number 25. The most serious of these was one which occurred on the Kroonstad Municipal Lands, where seven head of cattle and eight mules died from the disease before it was checked by inoculation. I do not think this record faithfully reflects the position of the Free State with regard to this disease.



## GLANDERS.

Although this disease has certainly not disappeared, the losses arising from it are not serious, and I think we may regard it as being well in hand.

*Cape Province.*—In the Cape Province outbreaks are steadily diminishing in numbers: in 1912 there were 40; in 1913, nineteen, while this year there have been only seventeen. The greater number of these have occurred in and around Cape Town, and there is no doubt that if a vigorous system of inspection could be instituted further cases would be brought to light which are at present hidden away in the poorer class of stables in the suburbs of the city. In dealing with these outbreaks, 43 animals died or were destroyed and 158 were tested and passed the test.

*Transvaal.*—Here again we find a reduction in the number of outbreaks: last year 36 were dealt with, this year there have only been eleven, in which twenty-one animals died or were destroyed and 118 in-contacts passed the test.

*Natal.*—In 1913, nine outbreaks of Glanders occurred in Natal: in 1914 there were seven and in the course of these thirteen infected or re-acting animals were slaughtered, the owners receiving compensation; while 62 in-contacts passed the Mallein test.

*Transkei.*—Here the disease has not been unduly prevalent—eighteen outbreaks were dealt with, thirty-two animals were condemned as infected and 338 in-contacts were tested.

*Orange Free State.*—In the Orange Free State the number of outbreaks has fallen from 18 last year to six during 1913-14. In dealing with these, two animals were found visibly infected, 74 were tested and six re-acted and were destroyed.

## LUNGSICKNESS.

*Cape Province.*—For nearly twelve months the Cape Province proper was free from this disease, but in December last two outbreaks occurred in Kingwilliamstown District, one at Bombani's Location and the other at Debe Valley; in January a third outbreak occurred at Iquibica's on Jali's Location; and in February another case occurred on an adjoining Location. These outbreaks are attributed to infection from an old lunger (an animal which has recovered from the disease but which has retained a capacity for infection). In addition to these outbreaks two others occurred in the District of East London, bringing the total number up to six.

*Transvaal.*—There were four outbreaks of Lungsickness in the Transvaal during the year, in dealing with which 142 animals died or were destroyed and 503 in-contacts were inoculated. One of these outbreaks occurred amongst experimental cattle belonging to the Research Division, and there is little doubt that in this instance infection was introduced by the inoculation of certain animals for the purpose of obtaining Lungsickness virus.

*Natal.*—During the year Natal has been free from this disease.

*Transkei.*—This disease has given more trouble in Native Territories during the past year than during the former one, the comparative numbers of outbreaks being 51 and 35. The spread of infection is doubtless due to the relaxation of restrictions on the movement of the salted cattle, which are so largely used for transport purposes. These outbreaks occurred in thirteen different districts, and in checking them 114 infected animals were destroyed and 3,650 head of in-contacts were inoculated.

*Orange Free State.*—Like Natal, this Province has a clean bill of health so far as this disease is concerned.

## MANGE IN EQUINES.

*Cape Province.*—Twenty-nine outbreaks of equine scabies were dealt with, in the course of which 81 animals were placed under treatment and one was destroyed. This disease appears to be most prevalent in Uitenhage, Humansdorp and Port Elizabeth.

*Transvaal.*—Five outbreaks of Mange were reported; no animals were destroyed, and 331 in-contacts were placed under observation.

[U.G. 2—'15.]



*Natal.*—Senior Veterinary Surgeon Power reports this disease has practically disappeared in this Province; only nine outbreaks were reported and attended to.

*Transkei.*—Six outbreaks of Mange occurred in Native Territories.

*Orange Free State.*—In this Province there were four outbreaks of parasitic Mange in equines.

#### OTHER PROCLAIMED DISEASES.

*Epizootic Lymphangitis.*—In the Transvaal there was only one outbreak of this disease, in which one animal died and six were treated successfully; while in Natal the number of infected animals dealt with dropped from 72 in 1912-13 to 12 in 1913-14, all of which occurred in the coastal area; of these eleven were treated, and recovered, and one was destroyed. This satisfactory result is undoubtedly due to the adoption of Government Veterinary Surgeon Harber's permanganate of potash method of treating this disease, which has given most satisfactory results whenever it has been tried. The other Provinces have remained free from this disease.

*Swine Fever.*—There have been eleven outbreaks of this disease in the Transvaal; in every instance the premises where the outbreak occurred was placed under quarantine and the quarantine was maintained until all pigs on the premises had been killed off.

*Contagious Abortion.*—The existence of this disease in South Africa, which has long been suspected, has now been definitely confirmed by the Research Division. In the Transvaal there have been seven outbreaks, in which 68 affected animals have been located. Isolation and the use of the usual disinfectants has been prescribed, but there are reasons for believing that the disease is more prevalent than is generally suspected, and in time to come it is likely to become still more common, on account of the tendency of stock-owners to dispose of aborting animals by selling them without notifying the authorities. Outbreaks have also occurred in the Orange Free State to the number of four, the most serious being that on the Government Farm, Grootvlei. Here the infected animals have been separated from the healthy by means of the agglutination test and are now strictly isolated, so that there is every reason to hope that the steps which have been taken will serve to arrest the further spread of this disease amongst the stock on the farm. One outbreak of this disease is also recorded in the Transkei.

*Trypanozoonosis.*—Information having reached the Department of an abnormal mortality amongst cattle and stock in the fly area in Zululand, I visited this locality last August in company with Senior Veterinary Surgeon Power and prepared a special report with regard thereto, which is now in your hands and need not be specially referred to here. Most of the recommendations made therein have been acted upon by the Provincial Council, and the Research Division have now made arrangements to carry out certain investigations, with a view to deciding whether the mortality occurring in this area is due to attacks of the tsetse fly and may only be regarded as a matter of local importance, or whether other biting flies play a part in the spread of infection and there is any reason to apprehend the extension of disease from the area in which the tsetse fly is found.

#### NON-PROCLAIMED DISEASES.

The various Senior Veterinary Surgeons, in the course of their reports, have commented on certain diseases which have come under their notice to which the provisions of the Stock Diseases Regulations do not apply. Chief amongst these are Gal Lamziekte, Horse-sickness, White Liver in sheep and Fly Disease.

*Gal Lamziekte.*—Senior Veterinary Surgeon Dixon, Cape Province, states this disease has been particularly prevalent in the coastal districts from Komgha to Humansdorp. Many farmers in East London, Alexandria, Port Elizabeth and Humansdorp have lost heavily. In East London some of the farmers have attempted treatment, but without any encouraging results; while Government Veterinary Surgeon Jones, who is stationed at Uitenhage, reports unfavourably on the administration of hypodermic injections of "Extract of Levaeni," and the internal

administration of yeast, expressing the opinion that death appears to be hastened in infected animals by the administration of these preparations. In Natal, Senior Veterinary Surgeon Power comments upon the discovery of outbreaks of this disease on two farms in the Newcastle Division and on one farm in the Estcourt Division. The mortality on these farms has not been very heavy and the animals affected were Natal bred, in fact had been bred on the farms on which they had developed the disease. In the Orange Free State and in the Western Transvaal this disease has been very prevalent and the losses therefrom have been heavy, cases having been reported in many localities formerly believed to be free from this disease.

*White Liver in Sheep.*—This disease, whose precise character is unknown, has been reported as occurring in the Orange Free State. Government Veterinary Surgeon Joyce made enquiries respecting it, but the disease disappeared before the Department had an opportunity of going thoroughly into the matter. The symptoms, as described by owners of affected animals to Government Veterinary Surgeon Joyce, were as follows:—Sick animals were left by the flock, stood alone, would not feed, and gradually became comatose and died. In some cases diarrhœa was noticed, but this symptom was not constant. The disease generally ran its course in from two to eight days; practically all cases are said to have been fatal, but Government Veterinary Surgeon Joyce is of opinion, from an examination of the flocks amongst which the outbreaks occurred, that a certain number of animals took the disease in a mild form and got over it, and that on these animals the wool was lustreless and dry, and, in some cases, fell out. The *post mortem* appearances described were somewhat conflicting, but all agreed that two organs were generally uniformly affected—the liver, which generally had a cooked appearance, being light in colour and easily broken down; while the kidneys appeared to be converted into a blood clot. On some farms only ewes and weaners were affected, while on others a few lambs also contracted the disease.

Should a further opportunity occur of investigating this disease it is proposed to do so.

*Horsesickness.*—Generally throughout the Union this disease has not been at all prevalent, but in Humansdorp district the disease made its appearance almost in epidemic form in December, causing a very heavy mortality, chiefly amongst animals running on the veld, although stabled animals were also attacked. From Humansdorp the disease extended into Knysna, Uitenhage and Jansenville, but in these Districts the mortality was less heavy than it was in Humansdorp.

Twenty years have passed since the Eastern Province of the Cape was subjected to a similar visitation, and although it was at first believed the disease was not true Horsesickness, the diagnosis of the local Veterinary Officer was subsequently confirmed by the Research Division.

*Fly Disease.*—In the Transkei Senior Veterinary Surgeon Spreull records the occurrence of a remarkable plague of biting flies, with regard to which he makes the following remarks: “Shortly after the very heavy rains which were experienced along our coast belt in March 1913, a very serious plague of flies manifested itself, causing annoyance to human beings and animals alike, but in the latter cases dealing out death also. Mortality occurred amongst cattle, horses, donkeys and sheep, chiefly brought about by worry and anæmia through the excessive quantity of blood which the flies (chiefly stomoxys calcitrans) extracted from their victims. A species of simuliid and several sarcoptidæ were also implicated in these attacks.”

In addition to these diseases, Senior Veterinary Surgeon Grist also comments on the occurrence of a severe outbreak of necrosis of the tongue in calves reported by Government Veterinary Surgeon Joyce as having occurred in the Ficksburg District of the Orange Free State.

#### VETERINARY SERVICES.

During the year many parts of the Union have been very badly supplied with veterinary officers. This may be attributed to two causes, first, and most important, to the comparatively small number of professional officers employed by the Department to look after an area so enormous as the Union; and second, to the circumstance that our East Coast Fever operations have compelled us to concentrate our officers in those districts attacked or threatened by the disease.



The consequence has been that we have had the greatest difficulty in meeting the demands for veterinary assistance, and there is no doubt that in many places disease has spread and is spreading by reason of the absence of professional officers from centres where they are most urgently required. This has not escaped the notice of the farming community, and, although at the present time much of the work which we are called upon to carry out is police work and its performance is not calculated to popularise the Government Veterinary Officers, it is gratifying to note that everywhere Farmers' Associations are clamouring for more veterinary assistance. At every Provincial Agricultural Association meeting resolutions have been passed, urging the Government to provide farmers with greater facilities for protecting their stock against disease, and suggestions have been made by them as to how this may best be done.

Generally speaking, the proposals put forward have taken the form of a recommendation that more Government Veterinary Officers should be employed, that the area placed under their care should be reduced in size and that the fees should be charged for attending to cases of a non-contagious character, the fees to be paid into revenue. This idea appears to be more popular than that of offering subsidies to veterinary surgeons and then endeavouring to induce men from overseas to settle down to practice in this country; and I must say the scheme advocated appears to be the more feasible, for the following reasons: to begin with, there is a serious shortage of professional men at the present moment, on account of the comparatively small number of students taking up the study of veterinary medicine. For this reason alone it would be exceedingly difficult to induce men to come out on payment of a small Government allowance, and it would be still more difficult to get these men to stay if they found themselves in a district whose bad debts were more easily accumulated than cash, especially when the distances to be covered are so enormous as they are in this country.

District Surgeons in many parts are hard put to it to make a living, and as it is quite certain that farmers would not be willing to pay as liberally for advice in case of sickness amongst their cattle that they do when there is an illness in their family, the subsidised District Veterinary Surgeon would find it hard indeed to make ends meet.

Another most important point which those who advocate the subsidy system have overlooked is this, that for many years to come and until an era of closer settlement dawns the average stock farmer will have to depend largely upon his own efforts when an animal is ill, and what is needed most of all by farmers is such instruction as will enable him to help himself. This the Government Veterinary Surgeons could supply if they were present in stronger force, whereas the subsidised veterinarian could hardly be expected to spend much of his time in picking his own pocket by teaching his clients to do without him.

It must not be supposed from these remarks that I suggest that each farmer should receive instruction of an empirical character from Government Veterinary Surgeons, but in this country, apart from the outbreaks of proclaimed disease with which Government officers are required to deal, stock are not afflicted to any great extent by those ailments so common in other less favoured countries, and if the farmer could be shown what to do in emergencies, and receives some instruction in the rudiments of first aid, many animals would be saved to the country, which are now lost by reason of a want of knowledge on the part of an owner to do what is required, and which would be lost if the farmer had to wait for a veterinary surgeon to come round and render the necessary assistance. It may, of course, be argued that in some localities the farming community is almost, but not quite, wealthy enough to support a private practitioner, and that in such centres the grant of a small subsidy by Government would enable private practitioners to settle down in these areas and make a comfortable livelihood, but my own view is that the needs of such a community can be better met by placing a temporary Government officer there for two or three years and charging fees for all work done by him, paying the proceeds into revenue. If at the end of three years the community has shown proof of its ability to support a practitioner, then the practice which the officer has built up could be handed over to him if he so desired; he would then cease to be a Government officer and would depend upon his fees for a living. But if, on the other hand, after the lapse of three years the community appeared indisposed to contribute an amount equivalent to the small salary paid to Government officers, then the natural inference would be that they did not want a veterinary surgeon very badly, and he might then be withdrawn and placed somewhere else where his services might be better appreciated.



An arrangement of this sort would be infinitely better than any general subsidy scheme, which would swallow up an enormous amount of money which might lead to the stranding of a number of distressed professional officers in various parts of the country, and would lead to much heartburning as to which districts should receive subsidies and which would not, and it would have the added advantage of saddling the Government with the cost of maintaining an officer in a district for a limited period instead of setting up a drain on the revenue of the country which might continue for an indefinite period and which it would be difficult to check. Moreover, men located under these conditions would be men whose reliability had been proved during their term of service in Government employment, and would have received instruction with regard to dealing with outbreaks of proclaimed diseases which would make them invaluable in emergencies as a second line of defence, and who could then be depended upon to supplement the ordinary Government Veterinary Staff.

#### RINDERPEST.

In my last report I referred to the menace of Rinderpest then prevalent in German East Africa. Our danger from this quarter appears no greater now than it was a year ago, and from information furnished by one of our own officers, presently seconded for duty on the Nyassaland border, and supplemented by that supplied by the German authorities themselves, there is no doubt that the Veterinary Department in German East Africa are exerting themselves to the utmost to hold the disease in check, and their efforts are being attended with a considerable amount of success.

As in former years, this Division has been well served by all its officers, and it is entirely owing to the manner in which the staff, both professional and clerical, have discharged their duties that the position of the country with regard to stock diseases is as satisfactory as it is to-day.

To this report I append the following returns:—

1. List of Staff in the various Provinces.
2. Outbreak Returns for the various Provinces.
3. Import Return, Cape Province.
4. Import Return, Natal Province.
5. East Coast Fever and Dipping Tank Return, Transvaal.
6. East Coast Fever Return, East London.
7. East Coast Fever Return, King Williamstown.
8. East Coast Fever Return, Transkei.
9. Inoculation Return, Transkei.

C. E. GRAY,

Principal Veterinary Surgeon.

## ANNEXURE 1.

## VETERINARY DIVISION.

## List of Staff in the Various Provinces, 1913-14.

Name.	Title.	District.
<i>Transvaal Province.</i>		
J. M. Christy ..	Senior Veterinary Surgeon ..	Pretoria.
J. G. Bush ..	Government Veterinary Surgeon	Krugersdorp.
P. Conacher ..	" " "	Johannesburg.
J. Chalmers ..	" " "	Ernelo.
F. J. Dunning ..	" " "	Lydenburg.
W. G. Evans ..	" " "	Volksrust.
J. I. Edgar ..	" " "	Pietersburg.
R. S. Garraway ..	" " "	Pretoria.
G. Lee ..	" " "	Middelburg.
G. May ..	" " "	Rustenburg.
G. McCall ..	" " "	Nylstroom.
J. M. Tate ..	" " "	Potchefstroom.
H. M. Webb ..	" " "	Carolina.
G. C. Webster ..	" " "	Barberton.
M. Cunningham ..	" " "	Pretoria.
	(To be stationed at Mafeking.)	
G. F. Marais ..	" " "	Pretoria.
	(To be stationed at Standerton.)	
J. Bruce ..	Stock Inspector ..	Krugersdorp.
S. Crocker ..	" " "	Louis Trichardt.
W. J. Doring ..	" " "	Pietersburg.
J. Fotherby ..	" " "	Potchefstroom.
U. Frattucello ..	" " "	Johannesburg.
G. A. Jenkins ..	" " "	Boksburg.
J. P. O'Connor ..	" " "	Pretoria.
A. C. Massey Foster ..	" " "	Volksrust.
<i>Cape Province.</i>		
R. W. Dixon ..	Senior Veterinary Surgeon ..	Cape Town.
A. Goodall ..	Government Veterinary Surgeon	Cape Town.
W. Jowett ..	" " "	Cape Town.
E. Fern ..	" " "	Cape Town.
W. G. Pakeman ..	" " "	Aliwal North.
J. H. L. Lyons ..	" " "	Graaff-Reinet.
W. Simson ..	" " "	Craddock.
R. P. Jones ..	" " "	East London.
J. Nicol ..	" " "	Kingwilliamstown.
W. P. Hamlyn ..	" " "	Komgha.
W. Jones ..	" " "	Uitenhage.
A. Matthew ..	" " "	Elliot.
A. C. Kirkpatrick ..	" " "	Queenstown.
T. H. Dale ..	" " "	Mossel Bay.
<i>Natal Province.</i>		
W. M. Power ..	Senior Veterinary Surgeon ..	Maritzburg.
G. W. Freer ..	Acting Senior Veterinary Surgeon	Maritzburg.
F. Hutchinson ..	Government Veterinary Surgeon	Dundee.
J. L. Webb ..	" " "	Bulwer.
A. F. Harber ..	" " "	Durban.
Chas. Tyler ..	" " "	Port Shepstone.
A. Gonle ..	" " "	Maritzburg.
F. M. Hill ..	" " "	Ladysmith.
S. H. Ewing ..	" " "	Eshowe.
S. I. Johnston ..	" " "	Mooi River.
<i>Orange Free State.</i>		
A. Grist ..	Senior Veterinary Surgeon ..	Bloemfontein.
J. R. Hamilton ..	Government Veterinary Surgeon	Bloemfontein.
J. F. Joyce ..	" " "	Ficksburg.
C. A. Wadlow ..	" " "	Smithfield.
E. T. Clemow ..	" " "	Frankfort.
F. M. Skues ..	" " "	Bethlehem.

## ANNEXURE 2.

## OUTBREAK OF PROCLAIMED DISEASES.

During the year ending 31st March, 1914.

Disease.	Cape.	Trans- vaal.	Natal.	Transkei.	O.F.S.
<i>East Coast Fever</i> .. ..	14	14	76	151	—
<i>Tuberculosis</i> :					
Outbreaks .. ..	—	48	5	1	6
Died or destroyed .. ..	210	258	14	—	8*
Contacts tested .. ..	4,307	1,289	131	30	51
<i>Anthrax</i> :					
Outbreaks .. ..	577	241	25	106	25
Died .. ..	710	373	—	251	—
In-contacts dealt with .. ..	11,374	15,221	—	3,313	—
<i>Glanders</i> :					
Outbreaks .. ..	19	11	7	18	6
Died or destroyed .. ..	43	21	13	32	8
In-contacts Malleined .. ..	158	118	—	338	74
<i>Lungsickness</i> :					
Outbreaks .. ..	6	4	—	51	—
Died or destroyed .. ..	16	142	—	114	—
Contacts Inoculated .. ..	664	503	—	3,650	—
<i>Mange in Equines</i> :					
Outbreaks .. ..	29	5	9	6	4
Died or destroyed .. ..	1	—	—	—	—
Treated or under observation .. ..	81	331	—	—	—
<i>Epizootic Lymphangitis</i> :					
Outbreaks .. ..	—	1	12	—	—
Died or destroyed .. ..	—	1	1	—	—
Treated .. ..	—	6	11	—	—
<i>Swine Fever</i> :					
Outbreaks .. ..	—	11	—	—	—
<i>Contagious Abortion</i> :					
Outbreaks .. ..	—	7	—	4	1
Infected .. ..	—	68	—	—	—

\* Isolated.



## ANNEXURE 3.

RETURN OF LIVESTOCK IMPORTED INTO THE UNION FROM OVERSEA THROUGH THE  
PORTS OF CAPE TOWN, PORT ELIZABETH AND EAST LONDON, DURING THE  
YEAR ENDED 31ST OF MARCH, 1914.

Month.	Horses.	Mules.	Donkeys.	Cattle.	Sheep and Goats.	Pigs.	Dogs.	Cats.	Various.	Totals.
April .. ..	19	25	2	143	—	29	12	—	—	230
May .. ..	3	—	2	159	8	—	13	—	3	188
June .. ..	23	399	—	124	61	6	6	—	3	622
July .. ..	19	54	11	88	3	1	11	—	5	192
August .. ..	38	1,198	3	164	30	—	3	1	—	1,437
September .. ..	16	39	32	39	54	8	6	1	4	199
October .. ..	29	50	8	166	36	7	12	1	1	310
November .. ..	32	62	34	238	256	8	7	—	2	639
December .. ..	11	—	1	107	1	4	21	1	7	153
January .. ..	5	29	6	39	—	—	7	—	7	93
February .. ..	120	905	—	25	21	7	5	—	130	1,213
March .. ..	2	—	—	68	17	37	12	—	1	137
Cape Town .. ..	317	2,761	99	1,360	487	107	115	4	163	5,413
Port Elizabeth .. ..	9	25	3	240	39	3	8	3	2	332
East London .. ..	8	—	10	161	424	6	2	—	—	611
Totals 1913-14 .. ..	334	2,786	112	1,761	950	116	125	7	165	6,356

## ANNEXURE 4.

RETURN OF LIVE STOCK IMPORTED INTO THE UNION FROM OVERSEA THROUGH THE PORT OF DURBAN, DURING THE YEAR ENDED 31ST MARCH, 1914.

	Bulls.	Cows.	Heifers.	Calves.
CATTLE :—				
Shorthorn .. .. .	101	25	94	2
Devon .. .. .	39	28	30	4
Friesland .. .. .	16	9	20	—
British Holstein .. .. .	1	2	—	—
Ayrshire .. .. .	15	—	87	—
Jersey .. .. .	1	—	11	—
Angus .. .. .	8	—	9	—
Hereford .. .. .	7	—	5	—
Sussex .. .. .	1	—	—	—
Not pedigree .. .. .	2	11	—	1
Totals ..	191	75	256	7

	Entire.	Mares.	Geldings.
HORSES :—			
Thoroughbred .. .. .	—	45	27
Clydesdale .. .. .	—	5	6
Hackney .. .. .	—	5	—
Coaching .. .. .	—	1	—
Suffolk Punch .. .. .	—	3	—
Exmoor Pony .. .. .	—	1	—
DONKEY .. .. .	—	1	—
MULES .. .. .	1,264	—	—
Totals ..	1,264	61	35

DOGS .. .. .	Pedigree : 61	Not Pedigree : 84
--------------	---------------	-------------------

	Rams.	Ewes.	Lambs.
SHEEP :—			
Merino .. .. .	2,120	2,617	15
Dorset .. .. .	11	10	—
Cheviot .. .. .	1	1	—
Black Face .. .. .	2	3	—
Totals ..	2,134	2,631	15

## ZOOLOGICAL SPECIMENS :

Lemurs.	Japanese Cats.	German Cats.	Polar Bears.	Crocodile.	Turtles.	Tortoises.	Kangaroos.
18	2	1	2	1	15	60	2

## ANNEXURE 5.

## EAST COAST FEVER TRANSVAAL.

1st April, 1913 to 31st March, 1914.

District.	No. of Farms in quarantine on which cases of East Coast Fever have occurred 31/3/14.	No. of actual outbreaks during year.	No. of farms released from quarantine during year.	No. of farms cleared of cattle by means of slaughter during year.	No. of farms fenced under East Coast Fever Ordinance.	No. of cattle dipping tanks erected during year.	Comparative. No. of Farms in quarantine at 31/3/13.
Barberton ..	Nil	Nil	6	Nil	Nil	33	6
Carolina ..	1	Nil	5	Nil	Nil	Nil	6
Lydenburg ..	Nil	Nil	2	Nil	Nil	21	2
Piet Retief ..	19	10	17	Nil	3	8	27
Rustenburg ..	Nil	Nil	1	Nil	Nil	1	1
Wakkerstroom ..	1	1	Nil	Nil	Nil	—	Nil
Waterberg ..	Nil	Nil	1	Nil	Nil	3	1
Pietersburg and Zoutpansberg	6	3	7	1	10	50	10
Pretoria ..	Nil	Nil	1	Nil	Nil	5	1



# ANNEXURE 6.

Farms under Quarantine for East Coast Fever, East London, shewing position at 31st March, 1914.

Farm or Location.	Date outbreak Quarantined.	NUMBER OF ANIMALS.			REMARKS.
		Before outbreak Contacts.	Deaths from East Coast Fever past 12 months.	Date of last Death.	
Farm 64, Ward III.	..	214	2	June, 1913	Only one case has occurred ; all the cattle were received into Farm 63 Heavily tick-infested veld ; cattle are being dipped every four days in seven-day strength solution.
Farm 73, Ward III.	..	92	1	July, 1913	
Farm 76, Ward III.	..	140	53	March, 1914	
Farms 77 and 307, Ward III.	..	340	2	July, 1913	
Ward VII.					
Farm 30, s	..	329	Nil	—	Quarantine can now be removed.
Farm 34, s	..	171	Nil	—	Quarantine can now be removed.
Farms 37, 38, 40, s	..	330	5	February, 1914	No case of East Coast Fever appeared in this area for a period of ten months, when an outbreak occurred last February.
Farm 33, s	..	67	Nil	—	Quarantine can now be removed.
Farms 23, 25, 26, 27, s	..	597	65	February, 1914	There was considerable mortality before dipping operations could be enforced.
Farm 19, s	..	98	Nil	February, 1914	Quarantine now due to be removed.
Farms 17, 28, 29, s, Tower Hill.	..	151	Nil	January, 1913	
Paardekraal	..	878	14	August, 1913	Over 300 head of cattle have been removed from outside infected areas into Paardekraal.
Farm 24, s (Cefani)	..	157	1	September, 1913	
Farms 21, 22, s	..	296	4	November, 1913	
Tainton Village	..	268	91	February, 1914	Owing to mortality and want of facilities for dipping all the herds except those belonging to the owner of dipping tank have been removed into Paardekraal.
Upper Kwelegla	..	1,367	2	February, 1914	An interval of 9 months occurred between the two deaths.
Lower Gombie	..	148	1	June, 1913	
Lilyfontein	..	558	Nil	February, 1913	Quarantine due to be removed 30th May, 1914.
Braakfontein	..	725	1	December, 1913	
Koumeties Leegte	..	455	4	November, 1913	A number of cattle from this area moved to Paardekraal. Cattle are being regularly dipped every five days and hand-dressed under supervision of Stock Inspector and Special Police.
Commonages of East London, Amalinda and Cambridge.	..	2,951	10	March, 1914	
		10,356	256		

## ANNEXURE 7.

Farms under Quarantine for East Coast Fever, Kingwilliamstown, showing position at 31st March, 1914.

Farm or Location.	Date of outbreak Quarantined.	NUMBER OF ANIMALS.			REMARKS.
		Before outbreak Contacts.	Deaths from East Coast Fever past 12 months.	Date of last Death.	
Mount Coke Locations--					
Malakalaka's Location ..	February, 1912 ..	355	4	June, 1913 ..	Notwithstanding regular short intervals, dipping and hand-dressing under supervision of Stock Inspector, odd cases crop up in Putu's Location. Due to be released from quarantine now. Due to be released from quarantine June, 1914. Due to be released from quarantine May, 1914.
Putu's Location ..	September, 1912 ..	510	20	March, 1914 ..	
Faku's Location ..	October, 1912 ..	569	1	April, 1913 ..	
Ntantiso's Location ..	December, 1912 ..	1,223	Nil	December, 1912 ..	
Kings Cross, Blaney ..	February, 1913 ..	349	1	March, 1913 ..	
Farm 144.. ..	February, 1913 ..	399	1	February, 1913 ..	
Kingwilliamstown Commonage ..	December, 1913 ..	1,612	1	December, 1913 ..	
		5,017	28		

## ANNEXURE 8.

Outbreaks of East Coast Fever in the Transkei during year 1913-1914.

District.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	Total.	No. of Animals.		
														In herd.	Died or destroyed.	Inoculated, Treated, Etc.
Bizana	—	—	—	—	—	—	—	—	—	—	—	—	19	8,277	—	—
Butterworth	1	6	—	—	2	1	4	1	1	3	—	—	—	—	207	—
Elliotdale	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Engcobo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Flagstaff	—	—	—	—	—	—	—	—	—	—	—	—	1	769	9	—
Idutywa	2	—	2	—	2	2	2	5	2	2	1	1	22	4,494	54	—
Keifani	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Libode	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lusikisiki	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mount Ayliff	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
Mount Currie	3	—	—	—	—	—	—	—	1	—	—	1	5	335	5	—
Mount Fletcher	—	—	—	—	—	1	—	—	—	1	—	1	3	1,174	5	—
Mount Frere	3	1	5	1	2	3	3	1	2	2	—	1	24	4,360	268	—
Mqanduli	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ngqeleni	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nqamakwe	1	1	2	2	1	1	5	1	—	—	—	6	21	1,169	29	—
Port St. John	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Qumbu	—	2	6	2	2	2	—	2	—	3	1	—	20	5,129	213	—
St. Marks	—	1	2	—	—	—	—	4	6	—	1	—	14	—	28	—
Tabankulu	3	2	2	—	—	—	—	—	—	—	—	—	8	13,557	539	—
Tsolo	—	—	3	2	1	2	—	—	—	1	—	1	2	4,290	93	—
Tsomo	—	—	—	—	1	—	—	—	—	—	—	—	—	278	2	—
Umtata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Umzimkulu	—	—	2	—	—	—	—	—	—	—	—	—	2	187	4	—
Willowvale	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Xalanga	—	—	—	—	—	—	1	—	—	—	—	—	1	585	1	—
Totals	13	13	24	7	11	12	15	15	12	12	6	11	151	44,604	1,457	—



## ANNEXURE 9.

East Coast Fever Inoculations in the Transkei up to 31st March, 1914.

District.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	Total 1.4.13- 31.3.14.	Total 31.12.12- 31.3.13.	Total up to 31.12.12.	Grand Total.
Bizana ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	22,173	22,173
Butterworth ..	278	—	3,866	543	—	—	456	1,051	—	—	—	2,682	8,876	1,491	17,440	10,807
Engcobo ..	209	1,874	—	—	—	—	245	179	477	—	—	—	2,984	11,074	17,798	31,836
Flagstaff ..	—	—	—	—	—	—	—	—	—	—	—	—	—	28	16,876	16,904
Idutywa ..	—	—	—	—	280	—	—	—	—	—	—	—	—	2,364	18,260	20,904
Kentani ..	2,993	689	—	—	—	2,580	205	—	—	—	—	—	7,467	593	3,581	11,641
Libode ..	—	—	621	59	—	—	—	—	—	—	—	—	680	1,103	13,185	14,968
Lusikisiki ..	—	—	—	—	—	—	—	—	—	—	—	—	—	1,106	10,528	11,534
Mount Ayliff ..	761	661	752	1,087	1,661	594	—	—	—	386	1,161	223	7,286	2,490	—	9,776
Mount Frere ..	—	120	85	342	—	—	—	—	—	—	227	481	1,255	271	—	1,526
Mqanduli ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4,823	4,823
Ngqeleni ..	—	—	34	—	—	—	—	—	—	—	—	—	34	—	180	13,839
Nqamakwe ..	—	—	968	—	543	—	419	—	—	—	—	—	1,930	133	2,243	2,243
Port St. John's ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5,469	5,469
Qumbu ..	134	283	1,797	3,034	1,603	1,126	234	166	266	10	4,632	—	13,285	2,224	88	15,597
St. Marks ..	—	—	—	2,033	304	—	3,796	408	—	—	—	—	6,561	545	—	7,106
Tabankulu ..	—	1,406	4,452	1,237	—	293	74	—	—	—	283	4	7,749	1,652	4,384	13,785
Tsolo ..	237	2,460	523	75	940	182	—	—	—	1,014	79	—	5,510	4,162	9,005	18,677
Tsomo ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Umtata ..	701	2,992	81	10	—	—	55	40	—	35	17	—	3,931	6,578	19,615	30,124
Umnzinkulu ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	795	795
Willowvale ..	130	—	—	—	—	—	—	2	—	—	—	—	132	—	10,699	10,831
Totals ..	5,443	10,485	13,179	8,440	5,331	5,775	5,484	1,846	743	1,445	6,399	3,390	67,960	35,814	171,738	275,512

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## APPENDIX II.

## DIVISION OF SHEEP.

## ANNUAL REPORT, 1913-14.

The Secretary for Agriculture,  
Pretoria.

I have the honour to submit the following report of the work performed by this Division during the twelve months ended 31st March, 1914. As in former years, the report has been divided into three sections; the first dealing with the eradication of scab, the second with the improvement of the sheep and wool industry, and the third with the Stud Sheep Farm at Ermelo.

## SCAB ERADICATION.

A great deal of care and attention was devoted to the administration of the Scab Regulations, an endeavour being made to enforce those provisions with uniform firmness and tact. In all cases steps were taken for the prompt and effective treatment of the disease wherever it was discovered, and it is gratifying to observe that the efforts of the Division have not been unattended with success, a decided reduction in the number of infected flocks having been effected, as will be seen from a perusal of Statement No. 4 in the Appendix.

## ADMINISTRATIVE CONTROL.

In my Annual Report for 1912, the system of examination adopted, and the manner in which the Inspectors are controlled by the Senior Inspectors was so fully detailed that there is no need to enlarge on this subject, though it is perhaps as well to indicate the changes which have taken place in the staff and the number of field officers employed in the several districts of the Union. There were employed during the year under review:—

Senior Inspectors	...	...	...	...	...	25
Permanent Area Inspectors	...	...	...	...	...	311
Field Cornets in the Transvaal, carrying out the duties of Sheep Inspectors	...	...	...	...	...	76
Permanent Itinerant Inspectors employed principally on the Railway Lines of the Union	...	...	...	...	...	10
Temporary Itinerant Inspectors employed to supervise flocks trekking for pasturage	...	...	...	...	...	26
Dipping Supervisors employed at the Ports of Entry	...	...	...	...	...	9
Temporary Dipping Supervisors employed during the period of Compulsory Dipping carried out under Minister's Order	...	...	...	...	...	530
Volunteer Dipping Supervisors (unpaid) employed during Compulsory Dipping period	...	...	...	...	...	334

Of the officers permanently employed, seventeen Sheep Inspectors and one Field Cornet retired voluntarily, eleven were dismissed, and the following officials were retired under Act 29, 1912, on the ground of age:—

A. C. Davison, Esq., late Principal Inspector of Sheep;  
Senior Sheep Inspectors J. H. Louwrens, W. J. Smuts and  
H. A. van der Merwe;  
Sheep Inspectors C. J. Bischoff, W. Clarence, H. Dewey, W. C.  
Maytham and A. D. Thompson, Sr.

The gentlemen mentioned devoted the greater part of their lives to the eradication of scab, and that at a time when the administration of the Scab

Laws was a most difficult matter by reason of the serious opposition of the farmers to any legislation of this nature. They deserve great credit for the able manner in which they performed their duties under adverse conditions. It is unquestionable that the improvement of our laws relating to scab and the progress made against the disease are largely due to their untiring and whole-hearted efforts, and it is desired to take this opportunity of thanking them for their services and expressing a wish for their future prosperity.

During the year it became increasingly apparent that it is desirable that investigations into complaints by the public and alleged misconduct on the part of the field staff should be conducted as far as possible by the Principal and Senior Sheep Inspectors, and with this end in view steps were taken for their appointment as Justices of the Peace in order that they may take affidavits regarding such matters.

The Districts controlled by the several Senior Sheep Inspectors are shewn in Statement No. 2 in the Appendix.

#### APPOINTMENTS.

Major W. L. Currie, C.M.G., was promoted from the post of Senior Sheep Inspector, Area No. 4, Cape Province, to the position of Principal Sheep Inspector vacated by Mr. Davison, and Messrs. L. Badenhorst, C. R. van Heerden and R. P. de Wet were promoted to fill the places vacated by the three Senior Inspectors above-mentioned. Mr. H. J. Blignaut was appointed as an additional Senior Inspector in Natal and 41 additional Sheep Inspectors were appointed to permanent positions.

The list of candidates for appointment as Sheep Inspectors increased from 800 to 1,300, but notwithstanding this fact it has been most difficult to obtain men who are willing to serve in districts other than those in which they reside, and who possess the following qualifications, which are regarded as essential:—

1. A practical knowledge of scab and its treatment.
2. A thorough knowledge of the Act and Regulations.
3. Determination, energy and persuasive powers.
4. Truthfulness and strength of character.
5. Tact and administrative ability.

It is surprising how few of the candidates have a thorough knowledge of the disease and the method of dipping, and it is just this lack of knowledge on the part of large numbers of farmers—not to mention the native population—which makes the eradication of scab so difficult.

#### LEGISLATION.

The experience gained since the date of the promulgation of the existing Scab Regulations has clearly shown that, although an improvement on those previously in force, they are in many ways defective, and that amendments are necessary, more particularly if the constant movement of infected stock by unscrupulous speculators and farmers is to be brought to an end.

With a view to enabling the Division to take such steps as will ensure the eradication of the disease at an early date, the existing Regulations have been carefully reviewed and a revised draft has been submitted to the Governor-General in Council for his approval. Amongst other alterations of a minor nature, provisions have been included in the revised regulations for:—

- (1) The second dipping of infected stock to be given between the eighth and tenth days after the first dipping, instead of between the tenth and fourteenth days.

This course is necessary because it has been proved by experiments carried out by Mr. Shilston and confirmed by Sir Arnold Theiler, that the life cycle of the scab parasite is completed earlier than was at first thought.

- (2) The protection of scab-free areas and the isolation of badly infected ones.

This became necessary because in some districts of the Union practically no attention has been given in the past to the treatment of scab-infected animals, with the result that infected stock is constantly moved from badly infected areas into districts which have been practically freed from disease—thus nullifying the work done in the more progressive areas. It is thought that by insisting on all

stock entering clean districts being thoroughly dipped, and compelling the dipping of stock leaving the badly infected areas, it will be possible not only to maintain the ground that has been gained but also to confine the disease within certain boundaries where, by concentrating all our efforts, it can eventually be eradicated.

A number of petitions have been received from farmers in districts which are almost free from scab, asking for protection against introductions of infected stock, and it seems but fair that they should be given protection, seeing that they have gone to the trouble and expense of cleansing their districts. The adoption of this policy is likely to bring about the co-operation between farmers and inspectors which is so much desired.

- (3) Inspectors to take over infected animals forthwith, wherever they may be found, and to cleanse them, instead of leaving it to the owners of the stock to carry out the necessary dipping.

It is proposed to instruct inspectors to exercise this power in the case of negligent or ignorant owners whose stock has been twice infected within the preceding twelve months, and in all cases where owners have failed to report the disease.

- (4) The isolation of all infected stock moved in contravention of the law.

This provision is necessary because of the large numbers of infected stock so moved, and the fact that the fines imposed on offenders are so small and so totally inadequate, as to encourage such movements rather than to act as deterrents. It is to be regretted that the Act does not make provision for the imposition of such penalties for contraventions of this nature as would make it unprofitable for unscrupulous or negligent persons to move infected stock. At present the maximum fine is £50, and in no case has it been imposed on an offender. In Australia the maximum fine in different States varies from £100 to £500, with a minimum of £10, and in certain cases magistrates have power to order the destruction of the infected animals on the application of the Inspector.

There is a number of persons in the Union who appear to make it their business to deal in infected stock and even a fine of thirty pounds recently imposed in one case failed to act as a deterrent or to prevent the guilty person from making a handsome profit on the transaction, for on two or three subsequent occasions he moved infected animals.

Whilst taxpayers are being asked to vote over a hundred thousand pounds annually, it is surely in the best interests of the country that the penalty for offences of this nature should be such as to prevent unscrupulous persons from making a business of moving infected stock and to make owners examine their animals very carefully before moving them.

It is desired to make it quite clear that in advocating heavier penalties the Division is actuated solely by a desire to prevent the movement of infected stock and thereby protect the farmer who has spent a great deal of money in cleansing his flocks and his farm.

- (5) Owners to report the arrival of their stock within three days to the inspector into whose area they are moved.

In the past it has been found that speculators and farmers move infected animals into adjoining areas and dispose of them before the inspector can become aware that any movement has taken place.

In cases where prosecutions have been instituted for contravention of the Scab Laws considerable difficulty has been experienced by reason of the varying decisions of the Superior Courts as to what constitutes "ownership" and "control" of infected stock. In the case *Rex v. Marais* (C.P.D., July, 1912), it was held, "that the owner of sheep did not cease to be in control of sheep and as such the owner within the meaning of the Act merely because he had sent them to a farm of another person—from whom he had hired grazing—in charge of a herd or even without a herd." In the case *Rex versus Harvey* (T.P.D., September, 1913), it was held that, "if a man is the owner of sheep and they are under his control he must see that they are not infected with scab. He must know the ordinary signs of scab, and if those ordinary signs exist he must suspect scab in the sheep and must make the necessary report; or if there are not merely the ordinary signs of scab but the existence of the disease is so clear that none but a fool would think it was not scab the owner must report the fact to the authorities. . . . According



to the principles of our criminal law there must be *mens rea*." The judgment laid down further that "control" in cases of this kind was intended to mean that the person who has the control of a thing has the possession of it and that he has the management—to a limited extent it may be—of it. The judgment went on to say that it was not necessary to prove *mens rea* in the case of movements of infected stock in view of the absolute prohibition contained in the Act. The judgment in *Rex versus Harvey* was followed in the case of *Richards versus Rex*, and since that case was tried it has been very difficult to secure the punishment of farmers guilty of failing to report the outbreak of disease amongst their flocks. The difficulty was referred to the Crown Law Advisers who expressed the following opinion:

"The difficulties in question appear to arise solely from the conflicting decisions given by the Cape Provincial Division and the Transvaal Provincial Division respectively. The decision in *Rex versus Marais* undoubtedly gives effect to what was the intention of the legislature when the Act was passed. We can suggest no way of meeting the difficulty in the Transvaal created by the decision of the Transvaal Provincial Division except by an amendment which would directly state that the owner shall always be deemed to be in control of and to be responsible in respect of his stock."

In these circumstances, it is a matter for consideration whether it would not be advisable for the Minister to recommend to Parliament the passing of a short amending Act to deal with this point.

#### MOVEMENTS OF STOCK.

The Division has continued to discourage movements of infected stock, but, for the reasons mentioned in the preceding section, this has been a very difficult task. As it appeared that in some cases farmers suffered hardship as a consequence of the instruction given to inspectors that permits for the removal of infected stock should be granted solely on the personal authority of the Chief of the Division, the authority for the issue of such permits was delegated to the Senior Inspectors, and since this course was adopted there have been no complaints from the public in this regard.

Complaints have been received from Natal and those districts in the Transkeian Territories on the eastern side of the Drakensberg that infected animals are moved at the time of the annual treks for pasturage, whilst the farmers who move their stock complain that their animals become infected whilst in Natal or the Transkeian Territories, as the case may be. So far the investigation of complaints of this nature go to show that it is a case of the pot calling the kettle black, and with a view to putting an end to the movement of infected stock for pasturage, Itinerant Inspectors are appointed each year for a period of about six months, whose duty it is to examine all animals moved for grazing and to assist Inspectors in the Low Veld into which the sheep are moved until the return journey commences, when they again take up their position on the main trek roads and examine the stock as it returns.

During the year movements of infected animals to Johannesburg continued to take place, notwithstanding the efforts of the Division to put an end to them. No less than 791,962 sheep and goats were sent to Johannesburg Market from the several Provinces of the Union, and of these 57,489, or 7.25 per cent., were found to be infected on arrival there. In the previous year, 801,075 sheep and goats were received, of which 77,970, or 9.75 per cent., were infected. There is thus a reduction in the percentage of infected animals sent to Johannesburg, but at the same time these figures lead one to wonder whether *any* steps which could possibly be taken would prevent movements of this nature. The most careful attention has been devoted to this question and every possible solution of the difficulty has been carefully weighed and considered, but, so far, without the desired success. Experience proves that scab in Africander or other smooth-haired sheep cannot always be detected with the eye, and it is this fact which has made it so difficult to control movements of diseased animals; and the difficulty has been increased by the readiness and ingenuity of unscrupulous persons to avoid and deceive the inspectors. Itinerant Inspectors were appointed on various railway lines to intercept infected animals whilst in course of transit, but it was impossible to appoint inspectors at all railway stations, or to restrict the loading of small stock to particular stations, and this plan was therefore abandoned.

As previously stated, there are, unfortunately, in the Union of South Africa to-day, many persons who get their living by trading in infected animals which can generally be obtained at low prices. In some instances the animals are dipped in some weak and ineffective dipping fluid before they are dispatched to Johannesburg, and in many cases the visibly infected animals are removed from the flock before the loading station is reached, and it is only when the animals arrive at Johannesburg that the disease again becomes visible. In all cases where the evidence warrants such a course being adopted the offender is prosecuted for contravening the law, but the fine imposed when a conviction is obtained is generally so small that the accused nets a substantial profit on his venture, after he has deducted the amount of the penalty imposed for the crime.

Infected stock arriving at Johannesburg or Cape Town is at once placed in quarantine and is not allowed to leave the abattoirs alive, but the demand at these places and the facilities provided for keeping the stock until it can be slaughtered, which operation usually takes place within 48 hours, are such that there is practically no difference in the price paid for such animals and that paid for animals sold as clean, more especially when the market is a strong one and the stock is in good condition, and this fact tends to encourage the movement of infected stock. Unscrupulous persons have not hesitated to misrepresent to farmers in country districts the system of inspection in force at Johannesburg, by stating that all sheep arriving from the Cape, whether infected or not, are quarantined as a general rule, and that in consequence of the imposition of quarantine such animals realize at least 2s. 6d. per head less than stock which is declared clean. The object in view is of course to induce the owner to sell his stock to the speculator at a figure less than its value so that profits may be increased. So well has this insidious lie been spread that some farmers in the north-western districts of the Cape actually believed it and sent deputations to the Minister to put a stop to what they rightly considered an injustice. The deputations were taken to Johannesburg and they satisfied themselves that the animals were actually infected with scab and that, in some instances, dependent of course on the condition of the animals concerned for slaughter purposes, infected stock realized more than that which is free from disease. On one of these occasions a consignment sold before the sheep were examined by the Inspector was re-sold after it had been quarantined and realized the same price as at the first sale.

During the year ended 31st December, 1913, 57,489 sheep and goats were quarantined at Johannesburg, having been received from the several Provinces in the following proportions:—

Province.	Number received.	Number infected.	Percentage infected.
Cape .. .. .	554,374	40,259	7.26
Orange Free State .. ..	158,392	11,499	9.25
Transvaal .. .. .	79,196	5,748	7.25

It is hoped that with the promulgation of the new regulations it will be possible to overcome the difficulties connected with the illegal movement of infected stock, but in the meantime there is nothing more to be done. The following comparative statement of stock received and quarantined at Johannesburg during the last three years reflects the extent to which movements of

infected animals have been reduced, and shows that a steady improvement is taking place:—

COMPARATIVE RETURN OF NUMBER OF SHEEP AND GOATS RECEIVED AND  
QUARANTINED AT JOHANNESBURG, 1911-1912-1913.

Province.	Year.	No. of Consign- ments.	No. of Sheep and Goats.	Infected Consign- ments. 12 months.		Infected Stock. 12 months.	
		12 months.	12 months.	No.	%	No.	%
Transvaal .. ..	1911	478	71,754	54	11·30	8,189	11·41
„ .. ..	1912	533	80,118	51	9·57	7,797	9·73
„ .. ..	1913	527	79,196	38	7·21	5,748	7·25
Cape .. ..	1911	3,348	502,282	382	11·40	57,323	11·42
„ .. ..	1912	3,738	560,756	363	9·71	54,579	9·73
„ .. ..	1913	3,695	554,374	289	7·82	40,259	7·26
Orange Free State	1911	956	143,509	109	11·40	16,378	11·41
„ „ ..	1912	1,068	160,201	103	9·64	15,594	9·73
„ „ ..	1913	1,055	158,392	76	7·20	11,499	7·25
Natal .. ..	—	—	—	—	—	—	—
Union .. ..	1911	4,782	717,545	545	11·39	81,891	11·41
„ .. ..	1912	5,341	801,075	517	9·68	77,970	9·73
„ .. ..	1913	5,277	791,962	403	7·63	57,489	7·25

INTRODUCTION OF SMALL STOCK.

Stock from Basutoland is permitted to enter the Union only on condition that it is twice dipped before entering, under the supervision of the Dipping Supervisor, at the port of entry. The following are the ports of entry on the Basutoland border:—

Maghaleen, Clearwater, Joelsdrift, Qachasnek, Ficksburgdrift, Sinxondo, Pekadrift, Bushmansnek, and Jackmansdrift.

All such stock is marked in red tattoo oil with the letter B.

Stock from German South-West Africa is permitted to enter on condition that it is accompanied by a veterinary certificate of health and subject to examination by the Supervisor at the port of entry. All such stock is marked in red tattoo oil with the letter G. The ports of entry are Ramansdrift, Rietfontein and Nakab.

Stock from the Bechuanaland Protectorate is permitted to enter the Union on condition that it is certified to be free from disease. The port of entry is at Ramathlabama. It is proposed to open another port of entry on this border shortly.

Movements to and from Swaziland are still permitted in accordance with the original arrangement made with the Swaziland authorities, namely, sheep and goats which are free from scab may move without restriction.

ISOLATION POUNDS.

It is regretted that the difficulties complained of last year have not yet been overcome, and in consequence it has not been possible to establish isolation pounds. The matter is, however, still receiving attention, and it is hoped that it will be possible to establish these much-needed institutions during the course of the coming year, more particularly with a view to preventing the illicit movements of stock referred to above.



## EXPERIMENTS.

During the year a series of experiments was set on foot by Mr. A. V. Shilston, M.R.C.V.S., of the Government Veterinary Laboratories, Pietermaritzburg: these experiments embraced attempts:—

- [1] To ascertain the inter-communicability of the various scab mites between sheep and goats and *vice versa*.
- (2) To ascertain whether the scab mite found in the ears of goats thrives on other parts of the animal's body and whether sheep are attacked thereby.
- (3) To determine the life cycles of the several scab mites under South African conditions.
- (4) To ascertain whether kraals or sleeping places are a source of scab infection, and to what extent.
- (5) To determine the lethal effect of the various dips in use in South Africa on the scab mites.
- (6) To ascertain what effect caustic soda and sulphur dip has on the health of sheep if it be swallowed or allowed to enter shear cuts.

Owing to Mr. Shilston's accepting an important position in India, as Assistant to the Imperial Bacteriologist, Muktesara, it was impossible for him to complete all the experiments. The results of the sixth experiment were published in the *Agricultural Journal* and re-printed in Bulletin No. 57 of 1913. The conclusions arrived at by Mr. Shilston in regard to the third experiment were of such an important nature, in that they totally upset the conclusions arrived at by Gerlach in Europe—upon which South African Scab Legislation was based—that it was considered advisable by Sir Arnold Theiler to repeat, at Onderstepoort, the experiments conducted at Pietermaritzburg by Mr. Shilston, before making a public statement. The experiments at Onderstepoort confirmed the results of the Pietermaritzburg tests, it being proved that the life cycle of the scab mites is completed on the ninth and not on the fourteenth day, as was commonly believed, and Sir Arnold Theiler has since made a public statement to this effect. The life cycle of the parasites having been definitely determined, provision has been made in the revised Regulations for the second dipping to be given not earlier than the eighth or later than the tenth day after the first dipping.

The other experiments referred to were not completed before Mr. Shilston left South Africa, but they are being repeated at Onderstepoort under Sir Arnold's direction. Considerable data has already been obtained regarding the lethal effect on the scab mite of some of the dips commonly used in South Africa, and as soon as the tests are sufficiently advanced the information gained will be published for general information.

The importance of these experiments cannot be too greatly magnified, for it is obvious that a campaign against a disease of this nature cannot hope to be successful unless the life cycle and habits of the parasites responsible for the transmission of the infection have been accurately determined. In view of the large amount of money which has already been and is still being spent on the eradication of scab, it is most desirable that the scientific experiments recently undertaken should be continued until such time as all available information has been gained, in order that the campaign against scab may be placed on a sound and effective basis. Money spent on experiments of this nature is well spent, and may save the country the expenditure of thousands of pounds in the end.

It is to be hoped that when Sir Arnold Theiler publishes the final results of his experiments and reports on the efficacy of the different sheep dips at present on the market, farmers will not hesitate to use the dip which is recommended as the most effective as a remedy for scab in such manner as may be prescribed.

## EFFECT OF DIPS ON WOOL.

In view of the continued agitation by interested parties against the use of the lime-sulphur and caustic soda-sulphur dips recommended by the Department as a cure for scab on account of their alleged injurious effect upon the wool of the animals treated, it was considered desirable to conduct further experiments with a view to ascertaining the effect of both the official and certain proprietary dips on the dyeing and spinning qualities of South African wool. Messrs. A. and V. Robertson, of Maquabie, Amersfoort, the well-known stud breeders,

very kindly placed 373 of their sheep at the disposal of the Division, and the dipping was entrusted to Mr. R. B. Pickles, Sheep and Wool Expert for the Eastern Transvaal. The details of the experiments are as follows:—

#### FIRST SERIES.

One hundred and thirteen sheep with five months' wool were selected, dipped in the following preparations, and shorn seven months after being dipped:—

*Lime and Sulphur (Official formula).*—Eleven sheep dipped in accordance with the formula. Wool proved to be of good length, slightly earthy, showing no effects of dip whatever.

*Little's Dip (mixed according to directions).*—Eleven sheep dipped in the prescribed manner. Wool proved to be of good length, slightly earthy, no visible signs of dip, but tender.

*Cooper's Dip (mixed according to directions).*—Eleven sheep dipped in the prescribed manner. Wool proved to be of good length, slightly earthy, dip visible and smelling strongly of dip.

*Caustic Soda and Sulphur (Official formula).*—Eleven sheep dipped in accordance with the formula, but dip not boiled. Wool proved to be of good length, quality, medium condition, a little earthy, sound in staple.

*McDougall's Tobacco Extract (mixed according to directions).*—Eleven sheep dipped in the prescribed manner. Wool proved to be of good length, quality, medium condition, but smelt strongly of dip.

*Hayward's Paste (mixed according to directions).*—Eleven sheep dipped in the prescribed manner. Wool proved to be of good length, light condition, showing effects of and smelling strongly of dip.

*McDougall's Tobacco Extract and Sulphur (one-third of a tin of Tobacco Extract and 3 lb. 5 oz. of sulphur, at the rate of 10 lb. sulphur to 100 gallons of water).*—Eleven sheep dipped in the prescribed manner. Wool proved to be of good length and quality, slightly earthy, shewing signs of dip.

*McDougall's Paste (1 gallon tin to 50 gallons of water).*—Eleven sheep dipped in the prescribed manner. Sheep appeared to be very much distressed after being dipped in this preparation. Wool proved to be of good length and quality, earthy, slightly tender as result of dipping.

*Lime and sulphur (12½ lb. lime, 25 lb. sulphur to 100 gallons of water).*—Eleven sheep dipped in the prescribed manner. Wool proved to be of good length and quality, light condition, strong in staple and very kind to handle.

*Control Sheep.*—Twelve sheep undipped. Wool very earthy but of good length and quality.

#### SECOND SERIES.

Two hundred sheep with nine months' wool were selected, dipped in the following preparations, and shorn three months after being dipped:—

*Caustic Soda and Sulphur (Official formula).*—Twenty sheep dipped in accordance with the formula, but the dip was boiled before being used for twenty minutes. Wool proved to be of good length and quality, sound in staple, shewing no effects of dip.

*Lime and Sulphur (Official formula).*—Twenty sheep dipped in accordance with the formula. Wool proved to be of good length and quality, no effects of dip visible, and very kind to handle.

*Little's Dip (mixed according to directions).*—Twenty sheep dipped in the prescribed manner. Wool proved to be of good length and quality, medium condition, tender and shewing effects of dip.

*Cooper's Dip (mixed according to directions).*—Twenty sheep dipped in the prescribed manner. Wool proved to be of good length and quality, smoky, shewing signs of dip very much; very tender.

*Caustic Soda and Sulphur (Official formula).*—Twenty sheep dipped in accordance with the formula, the dip not being boiled. Wool proved to be of good length and quality, slightly discoloured.

*McDougall's Tobacco Extract (mixed according to directions).*—Twenty sheep dipped in the prescribed manner. Wool proved to be of good length and quality, light in condition, shewing slight signs of dip.

*Hayward's Paste (mixed according to directions).*—Twenty sheep dipped in the prescribed manner. Wool proved to be of good length and quality, shewing no effects of dip.



*McDougall's Tobacco Extract and Sulphur (mixed according to directions).*—Twenty sheep dipped in the prescribed manner. Wool proved to be of good length and quality, shewing slight effects of dip.

*Lime and Sulphur* ( $12\frac{1}{2}$  lb. lime, 25 lb. sulphur to 100 gallons of water).—Twenty sheep dipped according to formula. Wool proved to be of good length and quality; bright, light condition and kind to the touch; staple very strong.

*Jeyes' Dip* ( $\frac{1}{2}$  gallon to 50 gallons of water).—Twenty sheep dipped in the prescribed manner. Wool proved to be of good length and quality, but much discoloured, tender, and showing detrimental effects of dip.

*Control Sheep.*—Twenty sheep undipped. Wool of good length and quality, light in condition.

### THIRD SERIES.

Sixty sheep with eleven months' wool were selected, dipped in the following preparations, and shorn three months after being dipped:—

*McDougall's Powder Dip (mixed according to directions).*—Twenty sheep were dipped in the prescribed manner. Wool proved to be of good length and quality; bright, light condition; some fleeces with a break in staple.

*Kerol (mixed according to directions).*—Twenty sheep dipped in the prescribed manner. These sheep were badly infested with keds, which the dip had failed to kill. Wool proved to be of good length and quality; light condition.

*Caustic Soda and Sulphur* ( $3\frac{3}{4}$  lb. caustic soda 15 lb. sulphur to 75 gallons of water).—Twenty sheep dipped in accordance with the formula, the dip being boiled for twenty minutes. Wool proved to be of good length and quality, but showing signs of dip.

One half of the wool was sent to one of the English Universities and the other half to a Technical College, and the Professors at these Institutions have been asked to report upon every stage of its manufacture, more especially so far as its spinning and dyeing qualities are concerned. Needless to say, the details of the dips used were not disclosed, the different bales of wool being numbered in order to establish their identity. As soon as the detailed reports from the abovementioned institutions are received they will be published for general information.

Notwithstanding the statements made by the Prime Minister in Parliament and by the officials of the Department as to the reasons which the Government has for advocating the use of the lime-sulphur and caustic soda-sulphur solutions for the cure of scab, interested critics have continued in their deliberate attempts to discredit the Government for its action in this regard, and they have insinuated that the recommendations referred to were made without due consideration. Had the critics advanced proof that their knowledge of the disease known as scab was exhaustive, or had they even shown an intimate knowledge of the subject to which they so glibly refer, their objections might have been worthy of serious consideration, but so far no fresh facts have been adduced, and the opposition appears to rely on a reiteration of a condemnation originally arrived at at a meeting of six persons connected with the wool trade. In these circumstances it is perhaps as well briefly to detail the arguments advanced by the President of the Bradford Chamber of Commerce, in a letter addressed to the Department:—

“We condemn the use of caustic soda and sulphur and lime and sulphur dips for the following reasons:—

- (1) Because any wool so treated will certainly be badly damaged and is certain to fetch a lower price in the open market (as skin wool does) than wool which has not been so treated. This is clearly seen when it is stated that caustic soda and sulphur is used as sodium sulphide for fetching wool off the dead fleece.
- (2) Wool treated with caustic soda and sulphur being partially dissolved, the resultant weight of the fleece is considerably less than if the wool had not been so treated.
- (3) It makes the wool more difficult to scour; the caustic soda used combining with the sulphur, but on dissolving in water the caustic soda is set free and acts very powerfully on the wool, causing it to shrink considerably.
- (4) The effect of all alkaline soda salts destroys the spinning qualities of the wool, decreases the elasticity of the yarn, and always makes pieces made from such yarn take a ruddy colour in the dyeing. Wool which has been treated with alkaline salts will not spin to anything like as fine counts as the same wool which has not been so treated.



- (5) Wool treated with alkalis has a stronger affinity for colouring matters than wool not so treated, hence, when the former is blended with the latter, the result is that the fabric made from such blend shows unevenness of dyeing, causing endless trouble and claims for damages."

These statements might appear to anyone ignorant of his business to be conclusive proof that the Bradford Chamber of Commerce had justified its sweeping condemnation of two of the most effective scab cures known to veterinary science at the present time, and there is no doubt that the publication of these arguments in an anonymous pamphlet recently printed and widely distributed has furnished another weapon to the less progressive class of sheep farmers in South Africa which fails to recognise the enormous damage caused to South African wools by the ravages of scab. It is for this reason that the various objections are dealt with in detail, taking them *seriatim*:—

- (1) The South African Government is well aware of the nature of sodium sulphide and of the fact that it is used in removing wool from dead skins, but it is emphatically denied that the caustic-soda-sulphur dip, mixed in accordance with official directions, partakes of the nature of a wool solvent, and as proof it may be stated that some of the best prices obtained for South African wools have been made for fleeces which have been dipped in the lime-sulphur or caustic soda-sulphur solutions. It seems strange that wool-buyers continue to purchase, year after year, at top prices, what the Bradford Chamber calls "dissolved" wool.
- (2) Wool treated with caustic soda and sulphur in certain proportions will be dissolved, but the Government has been very careful to make it quite clear that the dipping fluid must be made in proportions which will not damage wool.
- (3) It is a well-known fact in wool manufacturing circles that wool is frequently treated with caustic soda or caustic potash in the scouring process, and that if hard water be used for scouring it becomes necessary to soften it artificially by the addition of caustic soda; but surely none but a fool would for one moment suggest that the caustic soda or caustic potash would be used by a manufacturer in proportions which would dissolve the wool.
- (4) The effect of all alkaline soda salts, when they are used improperly, is to destroy the spinning qualities of the wool, but the manufacturer would find his task an impossible one if he were prohibited from using alkalis. As a matter of fact the damage caused by the improper use of alkalis is hardly likely to be greater than that caused by the scab mites; for wool from sheep which have suffered from scab is brittle and structureless and has lost both its spinning and felting qualities.
- (5) It may be that wool treated with an excess of alkaline matter has a stronger affinity for colouring matters than wool not so treated, but the fact that manufacturers themselves use caustic soda and caustic potash in the course of the manufacture of wool into cloth is proof conclusive that whilst these substances may be dangerous when applied in a careless manner, they cause no damage to the wool when properly used. Reference to any standard work on the effect of alkalis on wool will show that in some cases caustic soda is used to strengthen the fibre. It all depends on the form in which and the degree of alkalinity to which the solution is made.

Mr. Fawcett stated that there is no doubt that the difference in the prices realised for South African and Australian wools respectively is largely due to the fact that it is well known that South African wool, which would otherwise be equal to Australian, has been treated with objectionable dips, and cannot therefore be expected to give the same satisfactory results as Australian wools, which are treated with neutral dips. In this connection it is well to point out that a lime-sulphur solution is the dip which was responsible for the eradication of scab in Australia, and that it is still the official dip of the Australian Government. The difference in the prices realised for Australian and South African wool is attributable to the fact that South African wool in the grease will not yield within ten per cent. of the amount of clean scoured wool which can be obtained from an Australian sample of equal quality. During the past six years the South African wool export has more than doubled itself and has risen

from a declared Customs value of 6½d. per lb. to 7¾d. per lb., within the same period, and the reports obtained by the Department from the leading London wool brokers all go to show that, whilst there is still room for further improvement, South African wools show a constant and increased appreciation in quality and get-up. Is it reasonable to suppose that wool merchants would pay increased prices for an article which is alleged by Mr. Fawcett to have deteriorated by reason of the Government's recommendation of the use of effective scab-destroying dips, unless they were satisfied that they were getting value for their money?

It is interesting to learn that the President of the Bradford Chamber of Commerce, in his evidence before the British Sheep Dipping Committee in 1903, stated that the best colour and quality of Merino wool came from South Africa and had done so for twenty-five years. One of the greatest advocates of the lime-sulphur dip used in South Africa was Mr. Allan Davison, the late Principal Inspector of Sheep, and for upwards of twenty years he has recommended the use of this dip as the best cure for scab, which possesses preventive as well as curative properties. Moreover, the districts which show the greatest progress against the disease are those in which the lime-sulphur solution has been consistently used for many years.

There is one fact which both farmers and wool merchants appear to overlook and that is that the Department of Agriculture has no interest to serve except to protect the interests of the farmers and to build up Agricultural Industries on sound lines. In concluding this subject, it may be added that no evidence has ever been adduced to this Department to show that the bodies and persons who have objected to the use of Government dips have any knowledge of scab or that they have ever attempted to cure or prevent this disease in countries with sub-tropical climates such as ours by the aid of the so-called "neutral" dips to which they so often refer; and in any case it is still contended that if the use of effective scab destroying preparations did all the damage its opponents credit them with, the Government will still be justified in insisting on their use until such time as scab ceases to exist in the Union of South Africa; for it is far better that our wool-growers should suffer temporary loss than that the State should be called upon to spend millions of pounds in futile efforts to overcome one of the greatest pests the wool-growing world has ever known.

#### DIPPING TANKS.

With the amendment of the Dipping Tanks (Advances) Act, 1911, it became necessary for the Minister to issue fresh orders in regard to this subject, and they were published under Government Notice, No. 2,047 of 1913. The effect of the Dipping Tanks Further Provision Act, 1913, was to transfer the responsibility for the construction of dipping tanks from the tenants to the registered owners of farms. During the year ended 31st December, 1913, no less than 2,909 sheep dipping tanks were provided within the Union, as follows:

Province.	Provided in 1912.	Provided in 1913.
Cape .. .. .	2,438	1,272
Orange Free State .. .. .	452	292
Transvaal .. .. .	1,242	804
Natal and Zululand .. .. .	421	541

It is regretted that it has not yet been possible to construct proper sheep dipping tanks on Crown Lands on which small stock is allowed to graze, and as it felt that it would be unjust to require the owners of stock concerned, whose tenure on such land is in many cases uncertain, to provide the necessary tanks, there are large tracts of land in the Union in respect of which facilities for dipping have not yet been provided. There are in addition numerous native locations and Mission stations whereon tanks have not yet been provided and where they are urgently required. The state of affairs disclosed is the more unfortunate by reason of the fact that on lands such as those described there are usually considerable numbers of native-owned flocks; and the absence of dipping tanks is hampering the administration of the Scab Laws to a very great extent. It is thought that this difficulty could be overcome by the institution of some provision by which the expenditure incurred in the construction of the required tanks could be recovered



in the form of a dipping fee (calculated on the number of stock dipped therein) or of rent in the manner contemplated by the Dipping Tanks (Advances) Act, 1911.

Particulars of the Sheep Dipping tank recommended by the Department were originally published in Bulletin, No. 7, 1912, and the information there given has now been supplemented by the issue of Bulletin, No. 63 of 1913.

#### DIPPING AND DIPPING MATERIALS.

There is unfortunately still a considerable amount of opposition to dipping by owners of stock who do not know the benefits to be derived therefrom or who have had the misfortune to suffer failure in their efforts to cure scab through the use of the ineffective dips or improper methods of dipping. It is surprising how many farmers there are still who do not know how sheep should be dipped, or who undertake dipping in a careless and perfunctory manner. In a large measure it is due to dippings carried out by people of this kind that the disease is kept alive; for improper dipping, no matter what dip is used, will not kill the scab mite though it may lead the flock owner to believe that his stock has been cleansed, with the result that it becomes a source of infection to all flocks with which it comes in contact.

A great many failures to cure scab are undoubtedly attributable to neglect in failing to give the second dipping within the proper time, which is of course, just before the mites which have hatched out after the first dipping begin to lay their eggs, or in not giving it at all. It is perhaps unfair to blame the farmers for this, for they have to a certain extent been misled by the Department permitting the use of dips whose directions differ from those laid down in the Regulations. Sir Arnold Theiler's experiments conclusively prove that the second dipping must be given not earlier than the eighth or later than the tenth day after the first dipping, and with conflicting views before him it is hardly surprising to find that sheep farmers have arrived at the conclusion that the second dipping cannot matter very much. If the dipping materials in common use in South Africa were calculated to destroy the fertility of the eggs of the parasite, in every case, there would be no need for a second dipping, unless as a precautionary measure, but unfortunately this is not so, for not even the Lime and Sulphur and the Caustic Soda and Sulphur dips which are the only two preparations known to the Division to have any effect on the fertility of the eggs of the scab mite can be depended upon to destroy all the eggs in one dipping. The Lime and Sulphur solution will account for a considerable percentage and the Caustic Soda and Sulphur mixture for a fair portion. The latter dip is not quite so effective on the eggs as the first-named. Both these dips have given excellent results in the field and they are recommended because they possess preventive as well as curative properties.

Complaints have been received that dipping is dangerous to the health of the sheep and that heavy mortality frequently follows the dipping of flocks. So far investigations have gone to show that losses of this nature have been due to the use of poisonous dips, the improper mixing of the dip selected, or else to the fact that the sheep have been hurried to the tank in a thirsty and heated condition and have there been improperly handled. Bulletin No. 3, 1913, deals with this question, and a further bulletin, written in the light of recent experience, will shortly be published.

#### LOSSES OF STOCK ATTRIBUTABLE TO DIPPING.

During the year some 102 claims for compensation for sheep and goats alleged to have died as a direct result of dipping were considered, and a sum of £1,176 6s. was expended in this connection, in addition to certain amounts surcharged against inspectors in cases where the losses were due to their negligence or failure to comply with instructions. One of the reasons why the mortality was so heavy was that funds were not available for the appointment of competent dipping assistants during the period of compulsory dipping in 1913, and in the circumstances the Department was compelled to avail itself of the services of volunteer helpers, some of whom experience showed to be totally unfitted to act as dipping assistants. As in previous years the chief losses were due to the use of poisonous dips. The proposal put forward in June, 1912, that the regulations should be so amended that claims would not be considered in cases where an arsenical dip was used has not yet been given effect to, and as, under existing legislation, it is open to question whether an inspector can insist upon the use of the official dips, which are both safe and effective, the Department is without a remedy in cases where owners insist on using arsenical preparations.



The following brief statement of the method in which claims were dealt with is appended for your information:—

Claims paid	...	...	...	...	...	42
Claims rejected—						
Loss less than 2 per cent.	...	...	...	...	...	14
Contributory negligence on part of Owners of						
Stock	...	...	...	...	...	16
Losses not proven	...	...	...	...	...	29
Fraudulent	...	...	...	...	...	1
						<hr/> 102 <hr/>

In no less than twenty-eight cases in which compensation was paid the losses were proved to be due to the use of an arsenical dip: in eight instances the cause of death was the administration of a second dipping in an arsenical wash within less than fourteen days from the date of the first dipping; in five instances the dip was improperly mixed and death was due to arsenical poisoning; in nine instances the sheep were exposed to inclement weather or were over-driven shortly after dipping with the result that poisoning by arsenical absorption followed; and in six instances the actual cause of death was not ascertained. In two cases sheep died after dipping in lime and sulphur, the cause of death being poverty of condition and the consequent inability of the animals treated to recover from the effects of the dipping. In seven cases deaths resulted from the use of caustic soda and sulphur: in one instance the dip was improperly mixed; in two instances the sheep were carelessly handled at the tank and animals died by drowning; and in three instances the actual cause of death was not ascertained. In one case caustic soda and sulphur was used for the first dipping and an arsenical preparation for the second dipping, and the losses were due to arsenical absorption caused by the exposure of the animals treated to inclement weather just after dipping. In two cases the losses were due to the use of carbolic dips.

It is trusted that before long the amended regulations will be brought into force, as it will then be possible to repudiate claims in all cases in which poisonous dips are used.

In addition to the above a claim was received in respect of certain cattle which died as a result of their picking up poisonous dip whilst grazing near the dipping tank at Ugie, C.P., and compensation was paid to the extent of £26. The instructions given to inspectors regarding the necessity for burying poisonous refuse of this nature were carried out in this instance, but it transpired that heavy rains exposed the poison and the cattle got access to it.

A claim for damages in respect of stock wrongfully dipped by an inspector was unsuccessfully repudiated, the Appeal Court mulcting the Government in heavy damages and costs, and declaring a certain dipping order to be *ultra vires*, and steps have been taken to prevent a recurrence.

#### DIP DEPOTS.

In view of representations received from farmers in the north-western districts of the Cape Province, that dipping materials were unobtainable at certain centres, Divisional Councils, Magistrates and Senior Inspectors in that area were requested to furnish their recommendations. Some replies are to the effect that dip depots are not required, as the local storekeepers have sufficient material available at reasonable prices to meet the needs of farmers; others have recommended the establishment of dip depots, whilst a few have not yet replied. As soon as the required information comes to hand from the several districts concerned, the sites for the depots will be selected and tenders will be invited for the supply of the necessary materials. Only lime, sulphur and caustic soda will be stocked at Government depots. It may be added that during the compulsory dipping period large quantities of caustic soda and sulphur were stocked at temporary depots in Namaqualand, Sutherland and Van Rhynsdorp, and were sold to farmers in those districts at landed cost.

It is not intended to establish dip depots in towns, as that system proved in the past to be most unsatisfactory, and Government is not disposed to compete with private enterprise; nor is it proposed to establish depots at centres where storekeepers stock dipping materials for sale at reasonable prices.

## COMPULSORY DIPPING.

Between the 1st March and 30th November, 1913, the compulsory dipping of all sheep and goats within the Union was undertaken in accordance with a Minister's order issued in that behalf. In the first instance it was intended to enforce the dipping between the 15th March and the 30th April, but on account of the very severe drought which prevailed in many parts of the four Provinces and the consequent impoverished condition of flocks, it was deemed advisable to extend the period in some cases. Fortunately, before the end of February, copious rains fell in most of the drought-stricken areas and by the beginning of March matters had so far improved that it was possible to carry out the dippings in all parts of the Union during the months of March and April, with the exception of the districts of Boshof and Jacobsdal, in the Orange Free State; and Calvinia, Kenhardt, Namaqualand, Prieska, Sutherland and Van Rhynsdorp, in the Cape. In Boshof and Jacobsdal all dipping was completed by the end of May; in Calvinia by the end of September; in Namaqualand and Van Rhynsdorp by the 31st October; and in Sutherland by the end of November.

In the Transkeian Territories the dipping of native-owned flocks was commenced on the 1st April, and carried on until completion, which was about the 30th June.

In certain parts of the Transvaal, owing to climatic conditions, and in Zululand on account of the lack of dipping tanks, the months of March and April were found to be unsuitable and the dipping was postponed, though it was actually completed before the 30th November.

The funds placed at my disposal for the employment of supervisors was totally inadequate, and it was found necessary to call for unpaid volunteers to undertake the very necessary work of supervision. The principle of employing unpaid volunteers to perform work of this nature is a very bad one, I admit, but the dipping was very necessary on account of the increase of scab, and I had no alternative but to accept the assistance obtained in this way and to do the best I could.

Three hundred and thirty-four volunteers were employed, and it is desired to place on record the Division's appreciation of the assistance rendered in this connection. Speaking generally, the owners of the stock co-operated most loyally with the officials of the Division and valuable assistance was rendered by Magistrates, Divisional Councils, Farmers' Associations and other public bodies, and it is desired to thank them also for their services.

As regards the brands of dips used by officials, it is desired to state that although sulphur and lime and caustic soda and sulphur were strongly recommended by the Department, the use of these washes was not made compulsory, stock-owners being allowed to select the brand they preferred. Many farmers combined two or more kinds of dip.

Twenty-four million head of small stock were exempted from the dipping in terms of Sub-section (3) (a) of the Regulations, and about 23,580,000 sheep and goats were twice dipped. Of these the following numbers in the several Provinces were dipped under Government supervision:—

Province.	Sheep and Goats.	Losses.
Cape .. .. .	13,566,747	1·213%
Orange Free State .. .. .	3,145,554	0·394%
Transvaal .. .. .	1,387,240	1·032%
Natal .. .. .	1,101,720	0·93%
	21,422,236	2·732%

As this statement includes the figures relating to sheep which were twice dipped, the actual total number dipped under supervision was about 10,711,118.

It is regretted that, on the whole, the compulsory dipping of 1913 was not successful, the failure being attributable to the following causes:—

- (a) Owing to the varying climatic conditions it is not possible to complete the compulsory dipping of all sheep and goats in the Union within a limited period, and when dippings are postponed it is impossible to restrict the movement of undipped stock from the districts in which it becomes necessary to postpone the dipping.

- (b) Under the Regulations sheep or goats which have been free from scab for a period of twelve months were exempted from dipping, and owing to the fact that in most districts records had not been kept of cases of infection it was impossible to state with certainty which flocks had been infected and which had not, and the Inspectors being compelled in many instances to rely on the statements of owners there is little doubt that many flocks which should have been dipped were exempted from dipping. Moreover, the difficulty was increased by reason of the fact that numbers of new Inspectors had been appointed in many districts and they were unacquainted with the nature of their areas and the condition of the stock as regards infection.
- (c) The paucity of funds available, which necessitated the major portion of the dippings to be carried out without supervision.
- (d) Perfunctory dipping by farmers who dipped their own stock and by many of the Inspectors and Supervisors. The number of persons in the Union who are competent to dip small stock is limited and extreme difficulty was experienced in inducing them to place their services at the disposal of the Government when they were found.
- (e) The difficulty experienced in restricting movements of infected stock at a time when inspectors were so fully occupied in actual dipping operations that they were unable to get about their districts.

In view of the foregoing, the Minister was pleased to issue instructions that the so-called "simultaneous dipping" should not again be enforced throughout the Union, and that the Regulations should be amended instead, in the manner indicated in this report under the heading "Legislation."

I would add that should it be intended to enforce the compulsory dipping of all stock at any future date, the flocks of the Union should be dealt with piece-meal according to the varying climatic conditions; that there be no exemptions from dipping; that sufficient funds be made available for the appointment of competent supervisors to ensure every animal being dipped in an effective manner; and that the Division should be given authority to prescribe the dip which is to be used.

#### NUMBER AND PERCENTAGE OF INFECTED STOCK.

Statement "A" given below has been drawn up to show at a glance the number and percentage of sheep and goats which have been placed in quarantine during the six months ended the 31st December, 1913, and the number of stock still infected and in quarantine on the latter date. On the other hand, Statement "B" shows the number of districts and the extent to which they were infected on the 31st December, whilst Statement "C" shows the number of districts and the extent to which they were infected during the six months ended the 31st December, 1913:—



# STATEMENT "A."

Shewing number and percentage of Flocks and Small Stock quarantined during the six months ended 31st December, 1913, and in quarantine on the 31st December in 1911-12-13.

Province.	Year.	Total Number of Flocks in Province.	Total Number of Sheep and Goats in Province.	Quarantined for six months, 1st July to 31st December.				Infected Stock on 31st December, 1911-12-13.			
				Flocks.	Percentage.	Sheep & Goats.	Percentage.	Flocks.	Percentage.	Sheep & Goats.	Percentage.
A	B	C	D	E	F	G	H	J	K	L	M
Cape (including Transkei and Bechuanaland)	1911	119,005	28,951,926	—	—	—	—	2,299	—	977,740	3.45
	1912	124,694	27,402,995	—	—	—	—	3,765	3.01	1,000,998	3.45
	1913	121,037	26,328,616	8,701	7.19	3,025,636	11.49	1,721	1.42	491,061	1.86
Orange Free State..	1911	—	9,636,300	—	—	—	—	—	—	370,560	3.84
	1912	30,012	11,248,176	—	—	—	—	744	2.47	388,653	3.45
	1913	28,554	10,797,566	2,654	9.29	1,154,784	10.70	264	0.92	151,185	1.40
Transvaal ..	1911	—	5,126,018	—	—	—	—	—	—	180,000	3.75
	1912	41,026	6,160,411	—	—	—	—	335	0.81	126,455	2.05
	1913	41,071	6,996,767	2,924	7.11	793,081	11.33	153	0.37	53,283	0.76
Natal & Zululand ..	1911	—	2,508,532	—	—	—	—	337	—	—	—
	1912	30,491	2,768,501	—	—	—	—	228	0.74	43,794	1.58
	1913	41,523	3,091,077	1,569	3.78	396,170	12.82	158	0.38	33,735	1.09

Stock in Union.			Infected Stock, 31st December.		
	Flocks.	Total Stock.	Flocks.	Percentage Infected Flocks	Stock.
Union, 1912 ..	226,223	47,580,083	5,072	2.24	1,559,900
Union, 1913 ..	232,185	47,214,026	2,296	0.99	729,264
					3.27
					1.54

## STATEMENT "B" (COMPARATIVE).

Shewing number of Districts and percentage of Sheep therein which were infected on the 31st December, 1912 and 1913.

Percentage of Scab.	Province.	Year.	Free from Scab. No. of Districts.	Under 1% of Scab. No. of Districts.	1% & under 3% Scab. No. of Districts.	3% & under 5% Scab. No. of Districts.	5% and over. No. of Districts.
2.86	Cape Proper ..	1912	13	29	19	9	9
1.52	" ..	1913	22	25	20	8	4
10.69	Bechuanaland ..	1912	—	—	—	—	4
4.78	" ..	1913	—	—	2	1	2
6.39	Transkei ..	1912	5	5	4	3	2
2.61	" ..	1913	5	4	11	4	12
3.46	Orange Free State ..	1912	2	4	9	4	5
1.40	" ..	1913	5	8	8	2	5
2.05	Transvaal ..	1912	2	8	9	1	1
0.74	" ..	1913	5	12	5	—	—
1.58	Natal & Zululand ..	1912	3	3	4	—	—
1.10	" ..	1913	—	5	5	1	1
Total for Union ..	.. ..	1912	25	49	45	17	32
" ..	.. ..	1913	37	54	51	16	12

## STATEMENT "C."

Shewing number of Districts and percentage of Flocks therein which were infected during six months ended 31st December, 1913.

Province.	Clean. No. of Districts.	Under 2% Scab. No. of Districts.	Under 5% Scab. No. of Districts.	Under 8% Scab. No. of Districts.	Under 12% Scab. No. of Districts.	Over 12% Scab. No. of Districts.
Cape ..	2	10	13	22	16	16
Bechuanaland ..	—	—	1	1	1	2
Orange Free State ..	—	2	7	5	3	7
Transkei ..	—	6	8	8	5	2
Transvaal ..	—	2	6	8	2	4
Natal and Zululand ..	—	4	2	3	1	1
Grand total for Union..	2	24	37	47	28	32

For the purpose of comparison with a view to seeing what progress has been made it was the custom in previous years to show the percentage of infected flocks and sheep on the 31st December of each year, but as a district was sometimes infected in November, clean in December and again infected in January, the percentage given for December could not be regarded as accurately reflecting the state of infection of the several districts throughout the year; and as it is considered desirable that such information should be collected to enable the public accurately to gauge the measure of progress which has been made, and in order that the Department may adopt more stringent measures in those districts which show no progress, a commencement was made in July, 1913, to keep a record of the number of flocks and animals placed in quarantine throughout the year. It is the intention of the Division to furnish this information in future as shown in the abovementioned statements (A, B and C), where the figures have been summarized for each Province and also in Statement No. 6 in the Appendix, where the figures are shown in detail for each district.

Mossel Bay and Stellenbosch are the two clean districts mentioned in Statement C, and the following are the ones which had over 12 per cent. of scab during the six months referred to in that statement, namely:—

Natal: Alfred.

Orange Free State: Bethulie, Boshof, Fauresmith, Jacobsdal, Philippolis, Rouxville and Smithfield.

Transvaal: Bloemhof, Lichtenburg, Pretoria and Wolmaransstad.

Transkei: Elliot and Maclear.

Cape: Kuruman, Mafeking, Albert, Aliwal North, Caledon, Calvinia, Cape, Carnarvon, Jansenville, Kenhardt, Fraserburg, Hay, Hope-town, Prieska, Queenstown, Sutherland, Tulbagh and Victoria West.

From columns K and M of Statement A it will be observed that the following reduction in the numbers of infected flocks and small stock have taken place in the several Provinces of the Union:—

Province.	Infected Flocks.	Infected Sheep and Goats.
Cape .. .. .	1·59	1·79
Orange Free State .. .. .	1·55	2·05
Transvaal .. .. .	0·44	1·29
Natal .. .. .	0·36	0·49

These figures are satisfactory and go to show that the majority of Inspectors have been maintaining adequate control of the disease in their respective areas.

#### NORTH-WESTERN DISTRICTS OF THE CAPE PROVINCE.

From the percentage of infected flocks which arrived at Johannesburg from the Cape during 1913 it will be observed that fully 41,107 sheep and goats came from the North-western Districts. Although this shows a reduction of 25,695 against the figures for the previous year, the position is still far from satisfactory, and it is clear that even greater efforts will have to be made in the future than in past years if the movement of infected animals from these districts is to cease. One of the reasons why so many infected animals come from the north-west is because the sheep there consist chiefly of Africander and smooth-haired types and, as stated previously, it is very difficult to detect scab on such animals. There is no doubt that there is need for the exercise of greater care by the local inspectors and farmers in this connection, and it is essential that all sheep whose wool shows the slightest sign of having been disturbed or of being out of order should be caught and carefully gone over by the hand, as that is the surest means by which scab can be discovered on the classes of sheep mentioned. Notwithstanding the fact that large numbers of infected animals are still coming from the North-west and Bechuanaland, a decided improvement is to be observed in those districts in other respects. Farmers are co-operating with the inspectors to a greater extent than before and are paying more attention to their flocks. The number of dipping tanks provided in the following North-



western and Bechuanaland Districts during the years 1912 and 1913 is as follows:—

District.	Tanks provided in 1912.	Tanks provided in 1913.
Calvinia .. .. .	34	62
Carnarvon .. .. .	65	16
Fraserburg .. .. .	77	16
Kenhardt .. .. .	31	19
Namaqualand .. .. .	91	167
Prieska .. .. .	34	1
Van Rhynsdorp .. .. .	39	71
Sutherland .. .. .	12	23
Mafeking .. .. .	64	59
Vryburg and Taungs .. .. .	112	119
Kuruman .. .. .	21	91
Gordonia .. .. .	55	29

If this progress continues it will be possible to report considerable improvement within the next couple of years. The great drawback is that hardly any farms are fenced and that trekking is constantly taking place on account of the drought to which this part of the country is subject. It is felt that if better railway facilities can be provided many of the North-western Districts will become available for Merino sheep farming, as there are undoubtedly great possibilities for the extension of the wool industry in this area, and the difficulties complained of by farmers in these districts in complying with the requirements of the Scab Regulations will, to a large extent, be removed.

#### TRANSKEIAN TERRITORIES.

Scab was very rife in the following districts of the Transkei during 1912, but it is gratifying to state that considerable improvement has taken place in them all:—

Nqamakwe, Engcobo, St. Marks, Umtata, Maclear, Matatiele, Mount Currie, Mount Frere, Tsolo, Bizana, Flagstaff, Libode, Ngqeleni and Tabankulu.

Arrangements have now been made with the General Council whereby all dipping will be carried out by Supervisors appointed by the Council at the cost of the owners of the stock treated, but the Inspectors will retain all the powers vested in them by law and will devote themselves to surprise inspections and to the dipping of infected stock when such a course is necessary. This change of policy will take effect on the 1st April, 1914.

#### SHEEP AND WOOL.

The staff of this section of the Division has been increased by the appointment of Messrs. G. J. Schuurman and E. N. Roberts, the two students who received bursaries from the late Transvaal Government to enable them to undertake a course of four years' training in agriculture at the Hawkesbury College, New South Wales, and the Technical Institute at Sydney. They specialized in sheep and wool, and it is a pleasure to report that they justified their selection by the successful manner in which they completed their studies. Mr. Schuurman was awarded the gold medal, and Mr. Roberts was next in order of merit, which is very creditable indeed. On their taking up their appointments it became necessary to re-allocate the work, and accordingly the Union was divided into two, with Mr. Mallinson in charge of the Northern Division and Mr. McNab in charge of the Southern Division. The title of Principal Sheep and Wool Expert was abolished and two new posts of Senior Sheep and Wool Expert were created for these gentlemen. The two Divisions were in turn split up into five areas in the manner indicated in Statement No. 3 in the Appendix, which shows the headquarters of each expert.

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Farmers requiring the services of an expert to render advice or assistance in connection with the classing and mating of sheep, wool-classing, sheep-breeding, management, purchase of rams, etc., may apply direct to the officer in charge of the particular area in which they reside, and the necessary assistance will be rendered free of charge. It should be borne in mind, however, that the experts have a great deal of work to do and that their areas are very large, and for this reason applications for their services should be submitted at least six weeks in advance in order to avoid disappointment.

Mr. McKee was absent on leave during the year and spent some time in London in attending the wool sales, and he has since written several articles on this subject. Mr. Mallinson also went on leave, and whilst in England he collected a very fine exhibit of wool and mohair, which was shown at the Johannesburg and Bloemfontein Shows, together with the local exhibit of the Division. At the same time he investigated the complaint of the Bradford Chamber of Commerce regarding the use of the official seab dips in South Africa and the results of his inquiry were published in Bulletin No. 53, 1913.

During the period under review, the experts performed a great deal of valuable work by giving demonstrations and lectures, judging at agricultural shows, classing sheep and wool, advising farmers regarding the breeding, mating and management of their flocks, and by selecting suitable rams for breeding purposes. There is no doubt that a great deal has been and is still being done by the experts every year in placing farmers in a position which will ensure the improvement of their flocks. One has only to look back a few years to see what vast progress has been made; for, where formerly flocks consisted of Africander and bastard sheep, goats and every type of Merino bred in South Africa, there will now be found flocks of good Merinos of uniform type. A glance at Statement No. 4 in the Appendix will show the extent to which non-woolled sheep and goats have been replaced by Merinos.

Now that farmers have to pay high prices for good sheep country they are beginning to realize that non-woolled sheep and ordinary Boer goats do not pay, and that if the interest on the capital investment is to be paid and profits are to be made, animals capable of yielding a greater return must be kept. Just as the non-woolled sheep are giving way to Merinos, so inferior Merinos are giving way to better class stock, showing uniformity of type and better breeding.

The total number of sheep and goats in the several Provinces of the Union is shown in Statement No. 4 in the Appendix.

It will be seen from the abovementioned statement that flocks in the Cape have decreased by 1,074,379 and those in the Orange Free State by 450,610, whereas those in the Transvaal show an increase of 836,356, and those in Natal an increase of 322,576. Compared with the figures given for 1912, there is a decrease in the total number of small stock in the Union amounting to 366,057. This decrease is attributed chiefly to losses through drought and a bad lambing season. The losses through drought in the several Provinces during the year are estimated as follows:—

Province.	Sheep and Goats.
Cape .. .. .	522,756
Orange Free State .. .. .	242,820
Transvaal .. .. .	55,214
Natal .. .. .	33,863
Total .. .. .	854,653

The drought through which the country has passed during the last three years is certainly the most severe that as ever been experienced in South Africa, and it is a matter for congratulation that our losses have not been heavier than they were. Fortunately good rains have fallen in some districts, breaking the drought there and enabling farmers to send their stock to those districts and thus saving them. Visits to the districts mentioned below during the summer months, when the stock should have been in good condition, revealed the fact that all classes of animals, but more particularly cattle, were in very poor condition indeed, and the veld looked as if the animals in their search for food had pulled the grass out by its roots and left nothing but the bare soil. With

the large numbers of stock which some farms are carrying at the present time it will take many years before the veld in the affected parts recovers its normal condition. The Government had to assist farmers in the Orange Free State by granting special railway facilities for the expeditious movement of flocks in order to save them from starvation. It is always a wise policy to grant concessions of this nature, for such a course obviates movements of stock by road, and thereby tends to prevent the dissemination of disease.

The undermentioned districts in the Cape and Orange Free State Provinces were those in which the heaviest mortality occurred:—

Cape: Albert, Aliwal North, Calvinia, Cathcart, Glen Grey, Hopetown, Namaqualand, Queenstown, Tarka and Victoria West.

Orange Free State: Bethulie, Bloemfontein, Boshof, Fauresmith, Heilbron, Rouxville, Smithfield and Winburg.

The losses from disease in the several Provinces during the year are estimated as follows:—

Province.	Sheep and Goats.
Cape .. .. .	903,713
Orange Free State .. .. .	269,367
Transvaal .. .. .	242,310
Natal .. .. .	55,597
Total .. .. .	1,470,987

The principal diseases responsible for the mortality were Geilziekte, Blue Tongue, Wire-worm and Heartwater.

During the year approximately six and a quarter millions of sheep and goats were slaughtered in the Union, the details being as follows:—

Province of Origin.	Sheep.	Goats.
Cape .. .. .	3,062,903	1,091,500
Orange Free State .. .. .	1,311,653	35,485
Transvaal .. .. .	481,874	132,455
Natal .. .. .	138,832	21,718
Totals .. .. .	4,995,262	1,281,158

The total number of small stock slaughtered at the Johannesburg abattoirs during the year was 791,963.

It has been brought home to farmers in an unmistakeable manner that they will need to carry out stock farming on sounder and more systematic lines if they are to make a success of it; and there is no branch of stock farming where system is so much required as in sheep breeding. Wherever one goes one sees stock driven backwards and forwards for miles to drinking places, kraals and sleeping places. A more undesirable system of sheep farming cannot well be imagined; for it not only results in a lower price being obtained for the wool which has been damaged by the dust settling on the fleeces, but also in the destruction of the veld by the formation of sheep paths, which eventually become dongas and carry off the rainfall required for the nutrition of the natural grasses. It is thought that the cost of making paddocks and providing good clean water in each would soon be defrayed by the increased prices obtained for the wool. Weirs across rivers and dongas should be constructed wherever possible, as they would enable farmers to flood their veld and thereby increase its carrying capacity and provide fodder for the winter; and they will also stop the erosion of the soil which is to be seen going on in every part of the Union.



The losses experienced by sheep farmers could undoubtedly be minimized if the following precautions were taken:—

- (a) Farms should be fenced into paddocks and a supply of good, clean water should be available in every camp.
- (b) Farmers should prevent over-stocking by going in for quality rather than quantity and thereby reduce the number of stock without affecting their incomes.
- (c) Shade and shelter should be provided by planting suitable trees wherever possible.
- (d) Food should be provided for the cold winter months by growing drought and frost resistant grasses and crops; and finally,
- (e) A surplus supply of fodder should be kept for droughty seasons.

#### CLASSING AND MATING SHEEP.

When farms have been improved in the manner indicated, regular attention can be given to the classing of sheep, and it is in this direction that the Sheep and Wool Experts can be of the greatest assistance to farmers, for it is unquestionably the most important side of sheep farming, and as such is given their chief attention. Roughly speaking, over 350,000 sheep were classed by the eleven experts employed, and having regard to their numerous other duties, this is about as much as they can do in a year. The percentage of uniform flocks being very small, too much attention cannot be devoted to the scientific classing and mating of the flocks in the Union, as that is the surest and most direct way of effecting improvement. Farmers must bear in mind that it does not pay to keep mixed flocks of good and bad sheep, more especially when all the wool is sold together; for the wool buyer, when he comes to examine the bales, is very likely to base his calculations on the worst quality of the wool sent for sale, and the grower does not get the value of the better wools included in his clip. The difference is even more marked when good wools of light condition are mixed with heavy greasy fleeces.

The two Senior Experts and I recently visited the wool stores at the several ports and we then saw numbers of clips of heavy conditioned wool for which good prices could not be obtained, and we were informed that a great deal of this class of wool is sent down every year. Facts of this nature prove that there are still many flocks in the Union bearing fleeces of an undesirable character, containing an excess of yolk, and farmers are being advised to improve these sheep by mating the ewes with rams which do not show this fault. It is in the farmers' interests that this should be done, because the world's demand is for clean wool of light condition. Whilst on this subject it is desired to lay stress on the advisability of farmers, when selecting rams, seeing that they get those which will improve their flocks instead of buying simply because the animal is a ram and the price is low. It has been reported by the experts that large numbers of rams, totally unsuitable for breeding purposes, are being hawked round the country for sale to those farmers who think more of saving a few pence in the purchase price of a ram than of the pounds they will lose by reducing the value of their flocks. The value of a ram can only be judged by consideration of the influence it will exert in improving the flock with which it is to be mated. For these reasons farmers requiring rams are advised to purchase direct from breeders of good repute or to attend the annual live stock sales conducted by reputable auctioneers in the several Provinces.

Reports have also been received that large numbers of rams of very inferior quality are being imported from oversea, and recommendations have been made by farmers and public bodies that legislation should be introduced either for the prohibition of the importation of animals unsuited for breeding purposes, or for the imposition of a tax on every animal introduced. An import tax would no doubt prove a practical solution of the difficulty provided it did not exceed ten pounds for a ram or five pounds for a ewe; any tax higher than those mentioned would keep out a number of good breeding animals with which farmers could do. Unfortunately, South Africa is not yet so far advanced as to be quite independent of introductions of fresh blood from countries like Australia, and therefore taxation proposals need to be very carefully considered.

Another way of overcoming the difficulty would be to organise an annual sale of breeding stock at some central place (such as Bloemfontein), to which breeders of stud stock could send their surplus animals for sale by public auction. If such a course were adopted arrangements could be made for the attendance

of an expert to advise farmers who desired counsel, and it would not be long before purchasers of rams found it was to their interest to attend a sale of this nature, where they would be able to select exactly what they required to build up their flocks.

There are many types of Merinos in the Union, and advice is frequently sought as to which is the most suitable for a given locality. Broadly speaking, the experts of the Department recommend that in dry, dusty areas strong, long-woolled sheep with plenty of quality, combined with density should be used, as they are most likely to keep out the dust which causes so much damage in places where these conditions prevail, and the breeds which at present possess these qualities in a greater degree than any other are the Wanganella, the Murray and the long-woolled, plain-bodied Tasmanian. For areas with a good rainfall the Tasmanian is recommended as the type which will give the best results. The Rambouillet is regarded as good foundation stock because of its strong constitution and its susceptibility to improvement when mated with the Wanganella.

#### WOOL CLASSING.

In view of the attention which experts have been required to give to the classing of sheep, it has not been possible for them to devote much of their time to this work, and consequently a great deal of it had to be left in the hands of temporary wool classers specially employed for the purpose. In order to enable the Division to attend to all applications for instruction in wool classing, an endeavour is being made to train sheep inspectors so that they may assist farmers resident in their several districts. A few inspectors have already been trained and have rendered assistance in classing wool, but the progress has been somewhat disappointing owing to the difficulties experienced in providing facilities for the attendance of these officers at suitable centres. Several farmers have also been trained in wool classing by the various experts, and the number of persons in the Union qualified in this direction is increasing from year to year and must ultimately result in the better get-up of South African clips. It is trusted that the prejudice exhibited by some brokers against classed clips will in time be overcome; for their prejudice is due to the fact that they are labouring under the misapprehension that wool treated under Government supervision is overclassed. This is a misapprehension, because in some instances the fleeces are merely skirted, rolled and pressed, and the gentlemen referred to would do well to study the various lectures given by our experts on this subject, and also Bulletin No. 12, 1912. It is of course natural that those brokers who buy for speculative purposes should oppose the classing of wool, because it reduces the possibility of their making large profits at the expense of the farmers.

Mr. McNab reports that several wool-growers' associations in the Orange Free State are classing their clips and shipping them direct to London, and they are certainly not being disappointed, for they have in some cases realized up to 13d. per lb., and in many instances the prices ranged between 11½d. to 12½d. per lb.

The reports from our own experts and from London wool merchants clearly indicate that there is a considerable improvement shown in the get-up of South African wools, and it is apparent that notwithstanding the discouragement experienced, farmers realize that wool buyers cannot value a bale of wool with any certainty when it contains wools worth anything from 3d. to 1s. per lb.

In order to illustrate to farmers the extent to which their wools lose weight in the scouring process a small conditioning plant has been purchased with a view to giving demonstrations at agricultural shows, colleges and other centres frequented by the farming classes. This plant will be particularly valuable in disillusioning those farmers who believe that merchants buy wool at so much per lb. of its gross weight, without regard to the yield of clean wool.

So far as the marking of bales is concerned, it was decided at a Conference of Sheep and Wool experts to recommend the continuance of the following brands:—

First Fleeces	...	...	...	...	AAA
Second Fleeces	...	...	...	...	AA

etc., etc.

#### WOOL TRADE PRICES.

The prices realized for Merino wools at South African ports ranged from 5d. to 11¾d. per lb. for greasy wools, whilst in London 6d. to 13d. per lb. was paid. The London prices for Australian wool were from 7½d. to 17½d. per lb.

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for greasy, and from 15d. to 30½d. per lb. for scoured wool. Although prices for South African wools have hardened considerably of late, our farmers are not getting as much for their produce as their Australian brethren, and it is feared they will not do so until:—

- (a) They improve the quality of their clip and its condition; and
- (b) They improve the get-up of their wool; and
- (c) They discontinue up-country selling; and
- (d) They form themselves into co-operative societies and wool-growers' associations.

By taking the action indicated under (d) it will be possible for wool producers to take concerted action regarding all questions which effect their interests and by adopting practical steps for extending their market, such as the dispatch of trial consignments to large wool-consuming countries and thereby interesting foreign buyers and manufacturers in the South African commodity, they can bring about healthy competition at South African ports.

In order to interest America and Japan in South African wool correspondence was entered into with those countries and samples were sent to the latter, but this is not a very satisfactory method of dealing with so important a question and nothing has so far resulted therefrom. It would appear that the only satisfactory way in which this matter can be dealt with is to arrange for the shipment of a consignment of South African wool to each of the countries mentioned. If this scheme were adopted, arrangements would be made to value the wool at the coast before dispatch, and the whole experiment would need to be carried out under Government supervision from the time the wool left the sheeps' backs until it reached the factory, so that accurate data would be available regarding the cost of shipment, with a view to comparing the prices obtained oversea with those ruling in South Africa and in London.

From information collected by the Sheep Inspectors it would appear that farmers dispose of their clips more or less in the following manner:—

Province.	Number of Farmers .		
	Selling at Coast.	Selling Up-country.	Exporting Direct.
Cape .. .. .	3,850	36,817	11
Orange Free State ..	1,034	19,952	46
Transvaal .. .. .	528	5,728	16
Natal .. .. .	1,142	942	—
	6,554	63,439	73

The figures obtained do not of course represent the actual number of wool-growers who dispose of their clips in the manner indicated, but they serve as a guide to indicate the proportions in which wool is sold at the coast, up-country and oversea. It will be observed that by far the greatest portion of the South African wool clip is sold up-country, and this is a pernicious practice, for farmers cannot expect to get the same prices for wool up-country as is paid at the coast, owing to lack of competition and the fact that merchants up-country generally buy to sell at the coast with a view to making as much profit as possible on the transaction. It is considered that it is in the interests of wool-growers that all wool should be sold by public auction at coast ports, as the competition there is much keener and larger. No improvement can be hoped for in the get-up of our wools so long as they are sold up-country, for country buyers give little attention to the manner in which they have been got up, and more often than not they are simply buying the farmers' custom—a practice which is unfortunately too common in South Africa and largely responsible for the unsatisfactory state of our wool trade.

#### WOOL PRODUCTION AND DEMAND.

To illustrate the importance of the sheep and wool industry it has been considered advisable to include in this report statistics regarding the world's wool supply and the demand for that product.



The population of the world may be summarised as follows:—

Country.	Population.
Asia .. .. .	890,250,000
Europe .. .. .	501,160,000
East India Islands .. .. .	752,400
Africa .. .. .	33,650,000
African Islands .. .. .	4,511,650
North America .. .. .	115,886,000
Central America .. .. .	5,180,000
South America .. .. .	48,300,000
West India Islands .. .. .	3,200,000
South American Islands .. .. .	4,000
Australasia .. .. .	5,876,433
Oceania .. .. .	2,810,000
	1,611,574,433

The world's wool supply for 1914 is estimated at 3,000,000,000 lb. grease wool, the principal producers being the following:—

Country.	Weight of Wool in lbs.
Australasia .. .. .	840,000,000
Argentina .. .. .	415,000,000
Russia .. .. .	380,000,000
United States of America .. .. .	322,000,000
United Kingdom .. .. .	145,000,000
Uruguay .. .. .	130,000,000
South Africa .. .. .	112,000,000
	2,344,000,000 lbs.

Reckoning the wool supply at the figure named, it is obvious that there would not be more than 2 lbs. weight of grease wool per head of the world's population (*i.e.*, 1lb. per head of clean scoured wool), and as it requires 2lb. of clean wool to make a suit of clothes for a man and about  $3\frac{1}{2}$ lb. of clean wool to make a dress for a woman, it is quite clear that the supply would be altogether inadequate if everybody were to be dressed in woollen cloth. Moreover, one has to bear in mind the fact that in addition to the articles of apparel mentioned, wool is required for the manufacture of felt, underclothing, blankets, hosiery, etc.

The chief countries interested in wool manufacture are England, Germany, America and France, but of late years Japan has interested itself largely in the manufacture of cloth and the number of textile manufactures in that country is increasing every year. The United Kingdom alone imports annually for home consumption about 450,000,000lb. of wool in addition to the 145,000,000lb. of wool which she produces herself. In 1901, the total number of occupied persons in the United Kingdom was 15,388,501 and of these, 6.92 per cent. were employed in textile fabrics (wool, silk, cotton, etc.), whilst in 1907, no less than 261,192 persons in the United Kingdom were employed in woollen manufactures. In 1911, the United Kingdom imported wool to the value of £36,037,451 and in 1912 to the value of £36,567,818, whilst she exported wool yarn and manufactures to the value of £37,239,107 in 1911, and to the value of £37,773,504 in 1912. The United States of America imported raw wool to the value of £4,807,001 in 1911, and in 1912, this figure was increased to £6,615,668.

The following statement which has been taken from the Annual Review for 1913 of the National Association of Wool Manufacturers, United States of America is given as an indication of the number of sheep in the world. In some countries goats are included and some report lambs with the sheep, while others do not.

The figures for the Provinces of the Union do not include goats and are those collected in December, 1913, by the field-officers of this Division.

NUMBER OF SHEEP IN THE WORLD ACCORDING TO THE MOST RECENT AVAILABLE STATISTICS AND ESTIMATES.

Country.								Number of Sheep.
NORTH AMERICA :								
United States : Continental	..	..	..	..	..	..	..	*51,482,000
Non-contiguous, except Philippine Islands :								
Hawaii	..	..	..	..	..	..	..	76,719
Porto Rico	..	..	..	..	..	..	..	6,363
Alaska	..	..	..	..	..	..	..	199
Total	..	..	..	..	..	..	..	83,281
Total United States	..	..	..	..	..	..	..	51,565,281
Canada	..	..	..	..	..	..	..	2,389,300
Newfoundland	..	..	..	..	..	..	..	78,052
Mexico	..	..	..	..	..	..	..	3,424,430
Central America	..	..	..	..	..	..	..	124,044
Cuba	..	..	..	..	..	..	..	9,982
British West Indies	..	..	..	..	..	..	..	27,980
Dutch West Indies	..	..	..	..	..	..	..	22,643
Guadeloupe	..	..	..	..	..	..	..	11,731
								6,088,162
Total North America	..	..	..	..	..	..	..	57,653,443
SOUTH AMERICA :								
Argentina	..	..	..	..	..	..	..	80,401,486
Brazil	..	..	..	..	..	..	..	—
Chile	..	..	..	..	..	..	..	4,224,266
Uruguay	..	..	..	..	..	..	..	26,286,296
Falkland Islands	..	..	..	..	..	..	..	715,000
Colombia	..	..	..	..	..	..	..	746,000
Other South America	..	..	..	..	..	..	..	409,000
Total South America	..	..	..	..	..	..	..	112,782,048

\* Includes lambs.

Country.							Number of Sheep.
EUROPE :							
Austria-Hungary :							
Austria	..	..	..	..	..	2,428,586	
Hungary	..	..	..	..	..	7,168,054	
Bosnia-Herzegovina			..	..	..	2,498,854	
Total	..	..	..	..	..		12,095,494
Belgium	..	..	..	..	..	..	235,722
Bulgaria	..	..	..	..	..	..	8,130,997
Denmark, Iceland, and Faroe Islands					..	..	1,319,197
Finland	..	..	..	..	..	..	904,447
France	..	..	..	..	..	..	16,000,000
Germany	..	..	..	..	..	..	5,787,848
Greece	..	..	..	..	..	..	4,568,158
Italy	..	..	..	..	..	..	11,162,708
Montenegro	..	..	..	..	..	..	400,000
Netherlands	..	..	..	..	..	..	889,036
Norway	..	..	..	..	..	..	1,393,488
Portugal	..	..	..	..	..	..	3,072,998
Roumania	..	..	..	..	..	..	5,655,444
Russia in Europe			..	..	..	..	*39,200,000
Saxony	..	..	..	..	..	..	58,185
Servia	..	..	..	..	..	..	3,160,166
Spain	..	..	..	..	..	..	15,117,105
Sweden	..	..	..	..	..	..	1,010,217
Switzerland	..	..	..	..	..	..	159,727
Turkey	..	..	..	..	..	..	†6,912,568
United Kingdom, including Isle of Man, etc.					..	..	27,629,206
All other Europe	..	..	..	..	..	..	26,120
Total Europe	..	..	..	..	..	..	164,888,831
ASIA :							
British India :							
British Provinces	..	..	..	..	..	23,237,546	
Native States	..	..	..	..	..	3,321,366	
Total	..	..	..	..	..		26,558,912
Ceylon	..	..	..	..	..	..	96,335
Cyprus	..	..	..	..	..	..	‡294,456
Japan	..	..	..	..	..	..	3,411
Philippine Islands	..	..	..	..	..	..	88,760
Russia in Asia	..	..	..	..	..	..	38,017, 00
Turkey in Asia	..	..	..	..	..	..	45,000,000
Total Asia	..	..	..	..	..	..	\$ 110,058,874

\* Includes goats.

† Not including villayets of Scutari and Constantinople.

‡ Report of Consul J. H. Snodgrass, Jan. 6, 1913.

§ No data are available for China.



Country.								Number of Sheep.
AFRICA :								
Algeria	..	..	..	..	..	..	..	9,066,916
British East Africa	..	..	..	..	..	..	..	6,000,000
German East Africa	..	..	..	..	..	..	..	1,560,000
German South-West Africa	..	..	..	..	..	..	..	300,722
Madagascar	..	..	..	..	..	..	..	333,454
Rhodesia	..	..	..	..	..	..	..	250,182
Soudan (Anglo-Egyptian)	..	..	..	..	..	..	..	952,950
Tunis	..	..	..	..	..	..	..	615,584
Uganda Protectorate	..	..	..	..	..	..	..	471,296
UNION OF SOUTH AFRICA :								
Cape Province	..	..	..	..	..	18,585,704		
Natal Province	..	..	..	..	..	2,023,885		
Orange Free State Province	..	..	..	..	..	10,180,453		
Transvaal Province	..	..	..	..	..	5,017,958		
Total								35,808,000
All other Africa	..	..	..	..	..	..	..	1,130,335
Total Africa	..	..	..	..	..	..	..	56,489,440
OCEANIA :								
Australia	..	..	..	..	..	..	..	83,451,867
New Zealand	..	..	..	..	..	..	..	23,750,153
Total Australasia	..	..	..	..	..	..	..	107,202,020
Other Oceania	..	..	..	..	..	..	..	15,120
Total Oceania	..	..	..	..	..	..	..	107,217,140
TOTAL WORLD	..	..	..	..	..	..	..	609,089,776

The total number of sheep in the world given in the annual report of the abovementioned Association for 1912 was 626,872,186, and the total for 1913 being 609,089,776, there is a reduction in number of 17,782,410. The loss occurring principally in Europe and Australia. The large reduction of almost 10,000,000 sheep which has taken place since 1911 in Australia, the chief producer of Merino wool in the world is most significant, and it should be the endeavour of every wool grower in the Union of South Africa to make up the deficiency in the wool supply.

The statistics given clearly prove how important the wool industry really is, and emphasize the need for our farmers to co-operate in order that they may derive the greatest possible benefit from this trade. If the wool brokers and merchants find it necessary to band themselves together in order to protect their interests as traders, it is surely obvious that wool growers would benefit if they were to form an association for the protection of their interests as producers.

The following statement which has been taken from the Trade Return of the Union Customs and Excise Department shows the advance which has been made in our export wool trade:

EXPORTS OF SOUTH AFRICAN WOOL, MOHAIR AND SHEEP AND GOATSKINS  
DURING THE SIX YEARS 1908-1913.

Article.	1908.		1909.		1910.		1911.		1912.		1913.	
	Quantity. Lbs.	Value. £	Quantity. Lbs.	Value. £	Quantity. Lbs.	Value. £	Quantity. Lbs.	Value. £	Quantity. Lbs.	Value. £	Quantity. Lbs.	Value. £
Wool ..	104,252,696	2,768,086	130,973,389	3,728,251	121,668,028	3,830,819	132,207,029	3,899,828	161,974,684	4,780,594	176,971,865	5,719,288
Mohair ..	18,186,166	710,097	19,649,053	861,639	17,817,219	903,164	21,066,825	917,874	23,479,729	967,286	17,355,882	876,255
Skins— Sheep ..	19,283,396	374,350	23,746,655	551,910	24,630,435	603,280	23,996,966	574,457	29,029,147	724,196	32,196,400	889,611
Goats ..	6,920,990	190,958	8,155,981	254,003	7,282,229	274,947	7,469,158	262,636	8,126,360	291,695	9,104,691	325,936
Totals ..	148,643,248	4,043,491	182,525,078	5,395,803	171,397,911	5,612,210	184,739,978	5,654,795	222,609,920	6,763,771	235,628,838	7,811,090

It will be observed that during the year ended 31st December, 1913, there were exported from South Africa 176,971,865 lb. of wool valued at £5,719,288 as against 104,252,696 lb. of wool valued at £2,768,086 exported in 1908, or an increase in quantity of 72,719,169 lb. in weight and £2,951,202 in value during a period of six years, the average value thus being sevenpence-three-farthings per lb. in 1913, as against six-and-one-third pence in 1908.

#### SALE AND SHIPPING CHARGES ON WOOL.

The following statement is included to give an idea of the charges made by brokers at Durban and Port Elizabeth for the sale of wool at the coast and its shipment oversea respectively:

#### CHARGES MADE ON WOOL SOLD AT THE COAST.

Service.	Durban.	Port Elizabeth.
Receiving, weighing, storing, etc...	1/- per bale ..	1/- per bale.
Fire Insurance .. .. .	1/- per £100 ..	1 $\frac{1}{8}$ %.
Lotting Cataloguing .. ..	1/- per bale ..	3d. per bale.
Commission .. .. .	1 $\frac{1}{4}$ to 1 $\frac{1}{2}$ % ..	1 $\frac{1}{2}$ %.

#### CHARGES MADE ON WOOL SHIPPED TO LONDON.

Service.	From Durban.	From Port Elizabeth.
Receiving, weighing, marking, etc.	1/- per bale ..	1/- to 1/3 per bale.
Pressing (dumping) .. ..	2/9 per bale ..	2/9 per bale.
Cartage .. .. .	5d. per bale ..	No charge.
Shipping .. .. .	9d. to 1/- per bale	4/- per 800 lb.
Wharfage .. .. .	1/- per bale ..	4 $\frac{1}{2}$ d. per 100 lb.
B/L Stamps, etc. .. .. .	Varies, say, about 5/- per consign- ment.	—
Fire Insurance whilst awaiting ship- ment .. .. .	1/-% .. ..	1 $\frac{1}{8}$ to 1 $\frac{1}{4}$ %.
Marine Insurance .. .. .	5/- to 6/3% ..	4/6 to 6/3%.
Commission .. .. .	1 to 1 $\frac{1}{4}$ % ..	1 $\frac{1}{2}$ to 3%.
Brokerage (London) .. ..	1% .. ..	1 $\frac{1}{2}$ %.
Freight .. .. .	3/8 per lb., less 10%	3/8 per lb., less 10%.
London Consolidated charges, in- cluding auction expenses ..	4/6 per bale ..	4/6 per bale.
Fire Insurance (London) .. ..	1 $\frac{1}{8}$ to 1 $\frac{1}{4}$ % ..	1 $\frac{1}{8}$ to 1 $\frac{1}{4}$ %.

Of course different firms have different rates, and it is impossible to schedule the actual charges paid in all cases. The above charges can, however, be regarded as a basis to work upon. It is thought that every wool grower should acquaint himself with the system obtaining at the coast for the sale and shipment of wool in order that he may see what he is paying for and in what direction his clip requires improvement. In a good many cases at some of the ports wool is sold by private treaty. This practice is an undesirable one, as it is open to abuse, and for that reason it should be discontinued. Catalogue sales take place at all the ports, and if farmers insist on their agents selling the wool by public auction the practice of selling wool privately will soon disappear. If farmers find they cannot obtain satisfactory prices at the coast there is nothing to prevent them shipping their wool direct to Europe. There are several agents at the coast who would be willing to undertake the shipping at a reasonable commission and to advance from 60 to 80 per cent. of the value of the clip against the usual interest charged for such business.



## REDUCTION IN FREIGHT ON PRESSED WOOL.

As stated in my last report the Conference Shipping Lines granted a rebate in respect of all wool pressed in the Australian method, and an opinion was then expressed that only the farmer who shipped direct to Europe would benefit, but after personal investigation it appears that even he derives no benefit from the concession because the brokers who handle the wool insist on its being dumped before shipment and the charge made for this service is 2s. 9d. per bale, which is considerably more than the reduction granted. There could be no objection to a reasonable charge being made for pressing in circumstances where the service was necessary, but it is most unfair that brokers should persist in dumping wool that has already been pressed on the sheep farm in the manner adopted in Australia in view of the fact that the Conference Shipping Lines have agreed to accept wool so pressed at the reduced rate.

Farmers who have purchased Australian presses and press their wool in accordance with the Australian standard as laid down in the mail contract, would be well advised, in order to escape the charge of 2s. 9d. per bale levied for dumping, to ship their wool direct to Europe through an agent, who will not insist on this service.

On representations made by this Division the Railway Administration has very kindly granted a slight reduction in the railway rates for the carriage of pressed wool, and the question of a similar reduction in the rates for mohair is at present the subject of correspondence. The conditions which govern the grant of these concessions have not yet been satisfactorily arranged with the railways, but further information is being sought, and it is hoped that before long that the concession will be placed on a sound basis. The Railway Administration will derive benefit from the pressing of wool on the farms because that course will free a large number of trucks now used for the transport of wool for other traffic, and the wool trade will benefit because the course adopted will undoubtedly tend to induce farmers to improve the get-up of their wools, and it may be possible to persuade American buyers (who purchase pressed wools only) to enter the South African market.

## EXHIBITS OF SOUTH AFRICAN PRODUCTS

Representative samples of wool given by breeders in South Africa were included in the permanent exhibit of South African products in London, but the response to the requests made to breeders was very poor, and owing to lack of quantity the collection made an insignificant display compared with the exhibits of other British Colonies and Dominions. This exhibit is intended to interest purchasers from all over the world in South African wool and mohair, and if it is to achieve its purpose it will be necessary for a better display to be made. It is hoped that during the coming season wool growers in South Africa will assist the Division to strengthen the collection in London.

An Industrial Exhibition will be held in San Francisco in February, 1915, and it is thought that the South African wool-grower and Angora goat breeders should have their products represented there, as such an exhibition would furnish an excellent opportunity for American buyers and manufacturers to become acquainted with the good qualities of the South African products.

The exhibits of the Division shown at the various agricultural shows throughout South Africa have now been brought to a very high standard of excellence and possess an educational value which can hardly be over-estimated: they serve to demonstrate to our farmers the direction in which they should go and what can be done. The exhibits at Johannesburg, Bloemfontein and Port Elizabeth were large, and were certainly the best ever shown in South Africa. The Johannesburg exhibit in particular was prepared in a very attractive manner, and for this Mr. Pickles, Sheep and Wool Expert, Transvaal, deserves special credit.

## FARMERS' ASSOCIATIONS AND AGRICULTURAL SHOWS.

The agricultural shows held throughout the Union, and particularly those held at Bloemfontein, Port Elizabeth, Johannesburg, Rosebank, Kimberley and Middelburg (Cape) are doing a great deal towards the education of sheep farmers and the improvement of their stock, and are deserving of support by all progressive wool-growers. The thanks of the farmer are also due to the Agricultural Societies and Unions, which have done so much to stimulate agricultural

industries. Mr. McNab states that the quality of the sheep exhibited this year is a hundred per cent. better than that of those exhibited some four years ago, whilst Mr. Roberts (who recently returned from Australia) and Messrs. Mallinson and Taylor (who are well qualified to express an opinion) state that the quality of the sheep exhibited at some of the abovementioned shows is equal to that of the animals to be seen in the Merino section of the Australian Sheep Breeders' Show at Sydney. It can safely be said that the progress which has taken place in this direction is largely due to the untiring efforts of the Agricultural Associations of the Union in organizing annual shows.

#### ANGORAS AND MOHAIR.

It is regretted that it is necessary to report that during the year under review there has been a decrease of 122,363 in the number of Angora goats in the Cape Province and of 117,409 in the Orange Free State, whilst there have only been very small increases in the other two Provinces of the Union. Although there is little doubt that the recent drought accounted for a great deal of the loss over 50,000 having succumbed in the Cape Province—it is feared that some other reason is to be sought for the decline of this industry. Recommendations have already been made to you for the appointment of an Angora expert, and it is hoped that the appointment will be made at an early date in order that a full inquiry may be made and that such steps may be taken as will tend to build up this branch of our pastoral industry.

#### SHEEP AND GOAT SKINS.

It is desired to direct attention to the fact that South Africa is losing thousands of pounds annually through the faulty curing of sheep and goat skins. The following statement indicates the average difference in prices realized for well-cured and damaged skins:—

Sound: Merinos, 6d. to 7d. per lb.; Capes, 2s. to 3s. each; Goat skins (light), 12d. to 13½d. per lb.; Goat skins (heavy), 9d. to 10½d. per lb.; Angora skins (light), 7d. to 8¼d. per lb.; Angora skins (heavy), 4¼d. to 7d. per lb.  
 Damaged: Merinos, 5¾d. to 6d. per lb.; Capes, 2d. to 8d. each; Goat skins (light), 6d. to 7d. per lb.; Goat skins (heavy), 6d. to 7d. per lb.; Angora skins (light), 4¾d. to 7d. per lb.; Angora skins (heavy), 4¼d. to 7d. per lb.

Scab and bad flaying are responsible for a large percentage of the damage done.

#### WOOL PACKS.

During the year certain wool brokers suggested that wool packs used in South Africa should be standardized and that the different qualities should be indicated by weaving into them vari-coloured stripes. The matter was referred to the Trades Commissioner in London, and was fully investigated by him. He reported that users of South African wool desired it to be packed in such manner that it would be free from jute fibre: he pointed out that in all cases buyers deducted the nett weight of the pack and 1 lb. per cwt. when paying for wool, the latter allowance being made to cover the loss due to samples being taken out of the bales; and that no account was taken of half pounds. It was stated that it was desirable that the weight should be marked on the bales to facilitate handling, but it was thought that the suggestion of marking them with stripes was impracticable and would increase the cost unnecessarily.

The whole matter was fully discussed at a Conference of the Sheep and Wool Experts, and it was decided that the Government should continue to urge wool growers to use the 11½ lb. pack, as that has proved to be most satisfactory.

#### BURSARIES.

It is very gratifying to learn that the Government proposes to grant further bursaries to enable students to proceed to Australia to qualify in sheep and wool. The Government has done a great deal to build up pastoral industries in South Africa, but the number of experts available at the present time is totally inadequate for our needs, and it is better from every point of view that South Africans should be trained in this work, than that men should be imported from overseas, for the local man understands South African conditions, and this knowledge is essential to his work.

## INFORMATION REGARDING SHEEP FARMING.

The lack of an authoritative work on sheep and goat farming in South Africa has long been a severe handicap on our farmers, but arrangements have now been made for the preparation of a comprehensive series of articles on the various branches of the sheep and goat farmers' business by our experts, and these will be published from time to time in the *Agricultural Journal*. It is hoped that when the series is complete it will be possible for them to be published in book form for the guidance of farmers.

### STUD BOOK.

Now that sheep men in South Africa are progressing so favourably large numbers of stock are being registered annually in the South African Stud Book, and this is a good thing because it enables would-be purchasers of foundation stock and rams to know the lines upon which particular flocks have been built up. During the year this subject was discussed by the South African Merino Sheep Breeders' Association, and a scale of points was definitely laid down and is to be submitted to the Stud Book Association.

The main work of examination in the Free State, Transvaal and Natal was left to Messrs. Mallinson, McNab and Suter, with the result that it considerably interfered with their other duties. It has now been suggested to the Stud Book Association that all the experts should be appointed as examiners in order that the work may be divided, or else that the gentlemen mentioned should be relieved of this work.

### SHEARING.

The doctrine of annual shearing is still being preached and farmers are beginning to realize that the best prices are paid for long, shafty wools of good quality, and that, as a rule, it does not pay to shear twice a year.

Numerous complaints have been received regarding the difficulties experienced in obtaining competent shearers, and it has been suggested that sheep shearing and wool classing should be made the subject of short courses at all the agricultural colleges and that demonstrations and lectures on these subjects should be given at various centres throughout the country. One frequently hears of the large number of so-called "poor whites" for whom no employment can be found, and it is thought that an effort should be made to teach some of them how to shear sheep; for once they have learned the work the capital required to purchase a portable machine-shearing plant would not be great, and they would be sure of a livelihood.

### ERMELO STUD FARM.

During the year, Mr. Michaelian, the Manager, carried out a number of improvements which were essential to the establishment of a properly managed stud farm, and the flocks of Tasmanian and Wanganella sheep have, through careful culling and mating by Messrs. Mallinson and Michaelian, considerably improved in quality—so much so that it has been possible within the last two years to breed some very high-class stock—and the flocks are now so managed that it will not be necessary to import any more rams. This is very gratifying when it is remembered that in the first instance our stock lacked the quality and uniformity required to produce high-class breeding stock of a character such as is expected on a Government farm. The results obtained within the last two years clearly prove that with judicious mating and culling it is possible after a time to produce really well-bred stock without continually introducing fresh blood, and that it is not essential to purchase high-priced rams every year. Of course a great deal of time can be saved by purchasing high-class rams in the first instance, but unless the stock is carefully mated and due regard is paid to the lines of breeding, uniformity will be sacrificed and deterioration will take place.

It is regretted that just when the flocks and the farm at Ermelo have been brought to such a stage that really good results may be expected, it has been decided to close the farm.

The Manager's report for the year is appended hereto as Statement No. 1.

[U.G. 2—'15.]



## STATISTICS.

Statement No. 4 in the Appendix gives the following information:—

- (1) The number of small stock in the Provinces in the Union.
- (2) The increase and decrease in the different kinds of small stock in the various Provinces of the Union.
- (3) Losses from drought and disease.
- (4) Percentages of infection in the different Provinces.
- (5) Number of dipping tanks in the Provinces.
- (6) The number of stock dipped by inspectors
- (7) Number of prosecutions and the amount of the fines imposed .

Owing to the expenditure involved, the above information is not given for the different Districts in the several Provinces of the Union, as was done in previous years. Should anyone desire information on these subjects for any particular district of the Union, such may be obtained by application to the Chief of the Division of Sheep, Pretoria.

## CONCLUSION.

During the year under review the progress made has, on the whole, been satisfactory, and it is thought that the time has now arrived when it should be possible by a determined effort on the part of farmers and inspectors to eradicate the disease known as scab. The revised Regulations will admit of better control of the disease, and it is proposed during the coming year to make a special effort to overcome scab. It is in these circumstances that farmers and wool-growers throughout the Union are invited to assist the Government in cleansing their respective districts. No matter how good the law may be, or how competent the staff of inspectors may be, it is impossible to kill scab without the active co-operation of stock-owners, and I would earnestly plead for more assistance in this direction.

It is desired to express appreciation of the assistance rendered to the Division by farmers throughout the Union, by officials of other Departments of State, and by the Field Officers and clerical staff of the Division itself. Thanks are also due to the Trades Commissioner in London and many prominent wool-merchants, manufacturers and brokers, for services rendered in connection with the dip controversy.

The clerical branch of the Division is still under-staffed and difficulty is being experienced in obtaining suitable clerks, due mainly to the fact that the salaries paid to clerical officials are in most cases totally inadequate. It may be stated that an important change was made in the organisation of the clerical staff during the past year. The accounting work was transferred to the office of the Deputy Accounting Officer, and all staff work and the registration of correspondence was transferred to your office, my staff being suitably reduced. Since this action was taken it has been possible to devote more time to the real needs of our farmers, and the change has resulted in removing the friction which previously existed.

B. G. ENSLIN.

Chief, Division of Sheep.

## STATEMENT NO. 1.

REPORT OF THE GENERAL MANAGER OF THE STUD SHEEP FARM  
AT ERMELO FOR THE YEAR ENDED 31st MARCH, 1914.

## WEATHER.

The autumn of 1913 was very dry, which was rather unfortunate for our winter crops, which suffered considerably. The winter was very long and severe. Good spring rains were late in coming. The rainfall from 1st April, 1913, to 30th September, was four inches. The rainfall for the whole year was 29.36 inches. We had a rather unfortunate growing season. We had three hail-storms, the worst of the three occurring on the 12th January. This storm was local and did a lot of damage to the crops. In February we had a prolonged drought. The whole season in fact was one of long, dry spells and deluges.

## FINANCIAL.

The financial position for the year under review is reflected in the following statement:—

*Revenue.*—The total revenue collected falls to be allocated as follows:—

Sale of Live Stock	...	...	...	£1,257	6	7
Sale of Wool	...	...	...	186	14	2
Sale of Hides	...	...	...	8	4	11
Sale of Cream	...	...	...	0	12	3
Sale of Seeds	...	...	...	2	0	0
Hostel Fees	...	...	...	30	18	8
Students' Fees	...	...	...	58	0	0
				<hr/>		
				£1,543		
Department issues to other Divisions	...	...	...			
				<hr/>		
				£192		
				16		
				0		

*Expenditure.*

Salaries, Wages and Allowances	...	...	...	£646	1	0
Transport and Travelling	...	...	...	72	7	5
General Maintenance:						
Labour	...	...	...	1,551	1	11
Foodstuffs, Seeds and Fertilizers	...	...	...	367	5	0
Tools, Machinery, etc.	...	...	...	1,102	1	11
Maintenance of Hostel	...	...	...	123	10	3
Railage (estimated)	...	...	...	100	0	0
				<hr/>		
				£3,962		
				7		
				6		

I should like to add that the labour bill for the year was somewhat heavy, which was due to the large number of improvements that were undertaken and carried out.

The expenditure item of £1,102 1s. 11d. shown in the foregoing statement, comprises tools, machinery, saddlery, general repairs and farriery, incidental expenses and also sundry stores. Fully a third of this amount represents purchases of implements, which are of course on hand. A sum of £67 for ploughing, and some £50 for cement and timber, are also included, for which no previous provision was made.

I should like to emphasise the fact that the permanent improvements carried out, in the shape of stone water troughs, fencing, tree-planting, etc., enhances the value of the farm to a greater extent than is indicated by the total expenditure shown. In addition, it must be borne in mind that all the female stock produced adds materially to the value of the assets of the place.

## SHEEP.

The sheep have done well during the year. The older sheep suffered a bit during the winter. The summer was a healthy one for sheep on account of its not being too wet. Excepting a few cases of geilziekte we lost very few sheep from disease. Our sheep, having been inoculated, did not suffer from blue-tongue to any extent. Nearly all the sheep re-acted slightly, but nothing serious resulted. No farmer need fear blue-tongue if he uses the vaccine. I may, however, add that the directions of the laboratory authorities should be strictly adhered to, as I have heard of fatal results through careless inoculations.

We had a few cases of pneumonia. This, I think, is brought about by the sudden changes of the weather. For this complaint I have very successfully used a preparation called Tallianine. This is injected into a vein or under the skin in 5 c.c. doses. Care must be taken to spot the disease in the early stages.

We are not troubled to any extent by wireworm. This I ascribe to our sheep having plenty of good water and a constant supply of some good salt lick. We have a salt house in nearly every paddock, so that the sheep always have access to the lick. In paddocks where our sheep are watered from spring, lime is put into the water frequently to make it healthy. Some parts of the farm are not as healthy as they might be, on account of the great deficiency of lime and the presence of too many springs.

Maggots have given us very little trouble this year. Our sheep have been kept properly crutched. We have fortunately been without scab for years.

[U.G. 2—'15.]

In July we unfortunately had a few sheep poisoned with tulip, which came up among the winter oats. In October we had a severe hailstorm, which killed several ewes and lambs.

The ewes commenced lambing in May and finished in June. I am gradually bringing the ewes round to lamb in March and April. Lambing in mid-winter is a bit too severe on lambs. Two hundred and fifty-two lambs were dropped. Several Tasmanian ewes proved bad mothers. These ewes are of the excessively wrinkly type and have always been bad breeders. They have subsequently been got rid of. My experience has been that these very wrinkly ewes are invariably bad mothers and have little or no milk. Our object has been to breed a much plainer type of sheep, as we find they do much better in every way.

We run three types of Merinos on the farm, namely: Tasmanian, Wanganella, and Rambouillet. These three types do equally well on the high veld. I find that Wanganellas with good solid backs and a fair amount of condition in the wool do better here than the drier woolled and more open sheep of the same breed. This of course is easily understood, as we have a fairly large rainfall. The Rambouillet, though a sheep of good frame and sound constitution, does not compare favourably with the Wanganella or Tasmanian from a wool point of view, it being much shorter in the wool and not showing sufficient character. These sheep are good breeders and good mothers. We find that if the Rambouillet is crossed with the Wanganella the wool of the progeny shows decided improvement.

Regarding Tasmanians, big plain-bodied sheep have given us the best results. They will hold their own with any other Merino sheep. The small, heavy, wrinkly Tasmanian and the Vermont are sheep to be avoided, as they are a source of constant trouble. Where you find this type of sheep you usually find bad eyes, maggots, weak constitutions, bad mothers, very little mutton and still less wool.

Our annual sale was held last October, 82 rams and 51 ewes being offered. The prices realized for rams were from  $1\frac{1}{2}$  to 40 guineas, the average per ram being £9 17s. 10d. Some of the rams were rather young, and perhaps this is the reason why they sold so cheaply. I would recommend that only rams showing two or more teeth be sold at our next sale.

All our sheep were shorn in November. Machines were used for the first time. We have a six-stand Wolseley plant, which gave great satisfaction. The shearing was advertised, but unfortunately not many farmers availed themselves of the opportunity of seeing up-to-date methods of shearing and wool-classing. We had a few interested visitors, but I would have liked to have seen a great many more. Two of my natives very quickly learned to use the machines, and did excellent work. I should have liked to have had several farmers' sons to teach, instead of natives, but they were not available. Our wool was rather dusty on account of the hard winter. Below can be seen particulars of the shearing:—

Three hundred and sixty grown sheep were shorn.

Average weight of wool was  $14\frac{1}{2}$  lb.

Highest price obtained was 9 $\frac{7}{8}$ d.

Lowest price was 4 $\frac{1}{2}$ d. (Locks).

Average price was 8d.

The return per head was 9s. 6d.

Considering the number of aged sheep, and that these ewes have reared lambs through a hard year on the high veld, I reckon the prices realized are not too bad.

The sheep were all dipped in lime and sulphur. Up to the present they have grown an excellent length of wool, which is looking very well. My experience is that if lime and sulphur is mixed properly and the sheep are carefully dipped, the farmers need have no fear of losses due to its use.

Sheep on hand 31st March, 1914, is shown in the return at the foot of the report.

Birth rate was 75 per cent. Death rate for the year was  $5\frac{3}{4}$  per cent.; 2 per cent. were destroyed for old age; 1 per cent. was killed for the hostel.

#### FRIES CATTLE.

These cattle have done very well throughout the year, and there will be about ten young bulls for sale at our next sale. Four bulls were sold at the last sale, averaging £52 each.

The number of Fries cattle on hand 31st March, 1914, is shown in the return at the end of this report.



## ABERDEEN-ANGUS CATTLE.

This breed has fared well during the year. They are very hardy cattle and give very little trouble. The three young bulls sold at the last sale averaged £74 11s. This breed is steadily gaining ground in the Transvaal and Natal. The number on hand 31st March, 1914, is shown in the attached return.

## CROPS.

As I have said, it was a rather unlucky season for crops. Sixty acres of winter oats were put in in March and April, 1913. They were sown rather late, but pressure of work prevented them being sown earlier. They gave us a good bit of green food for the lambing ewes. They came on well in the spring, but just before they were cut the hail practically destroyed them. Had all the oats not been knocked out I should not have had to buy seed for my winter oats this year. Forty-six acres of New Zealand feed oats were drilled in September. These suffered a lot from drought and ripened a month too soon. One hundred and eighty bags of seed were threshed, 98 acres of mealies were planted, 48 acres of Silver Mine, and 50 acres of Yellow Congo. Three severe hailstorms fell on this crop, doing a lot of damage. We will be fortunate if we reap 800 bags. Sixteen acres of mangolds and 16 acres of turnips were planted. The mangolds were totally destroyed by hail, but the turnips have done well. Five acres of linseed were sown, which promises to be a great success. In my opinion this is a crop which should be more generally grown by farmers. It is a very valuable crop and is easy to grow. Forty acres of teff were sown. This crop would have been much better if we had had more rain at the right time. Fifty acres of mealies were planted for ensilage. Twenty-five acres of peas were drilled, which were also damaged by hail. Two thousand seven hundred salt bush plants were planted out. This shrub promises to be a success. All sheep farmers should try to establish this plant, as it is very drought-resistant and is very much relished by sheep.

Forty acres of winter oats were put in. The following varieties were sown: Algerian, New Zealand and Winter Dun. These are looking splendid. A lot more oats are being put in. Sixteen acres of rape, 2 acres of Cheu Moulhier, 4 acres of Drumhead cabbage, 4 acres of Winter rye and 4 acres of Swiss Chard were also sown for green food during the winter. The Swiss Chard or silver beet is a fodder plant which has given excellent results in New Zealand. It is merely an experiment here. All the above crops are looking well and should yield an abundance of succulent feed for the sheep in winter. Thirty-four acres of Tall Fescue and 6 acres of Cocksfoot have still to be put in. The land for the above grasses was broken up in 1912, grew an oat crop in 1913, and is being sown down with pasture grasses this year. I find that when new land is to be sown down with pasture grasses it is a good plan to first grow a crop of oats or teff. This makes the ground more mellow and better ensures the extermination of the natural grasses which, by the way, take some killing. I find it best to drill and then cross drill the grass seeds: that is, if 40 lbs. are sown to the acre, 20 lbs. are drilled in from say east to west, and the remaining 20 are drilled from north to south. It takes double the time but it gives you a beautiful even stand. I much prefer drilling to broadcasting. It is a great mistake to attempt to establish grasses on old, poor, weedy land. If grasses are to be grown on old lands, then they must be got into good condition and must be free from weeds.

It must also be borne in mind that when pastures are established they want careful looking after. One cannot expect pastures to yield an abundance of green feed in winter without proper care being bestowed on them in the shape of manures.

The following crops were harvested in 1913:—

Mealies	...	...	...	...	800 bags
Oats	...	...	...	...	215 bags
Oathay	...	...	...	...	80 tons
Teff Grass	...	...	...	...	70 tons
Potatoes	...	...	...	...	90 bags
Ensilage	...	...	...	...	120 tons
Roots	...	...	...	...	20 tons
Sweet Grass Hay	...	...	...	...	195 tons
Veld Hay	...	...	...	...	50 tons

## TREES.

Sixteen thousand trees were planted during the year. More could have been planted if ground was prepared, but this was not possible on account of the limited number of bullocks.

## HOSTEL.

We have accommodation for eight students on the farm; at present we have only one.

## FARM STAFF.

The following comprise the staff on the farm:

Mr. J. B. Gildea	...	Clerk.
Mr. O. Rivers	...	Sheepman.
Mr. P. Delport	...	Foreman.
Mr. L. Visser	...	Stockman.
Mr. W. Cowie	...	Handyman.

## RETURN OF LIVE STOCK AT ERMELO.

Date.	SHEEP.				CATTLE.							
	Ewes.	Lambs.	Rams.	Wethers.	Cows.		Heifers.		Calves.		Bulls.	
					Fries.	Aber-deen.	Fries.	Aber-deen.	Fries.	Aber-deen.	Fries.	Aber-deen.
31st March, 1913	.. 309	183	5	7	15	13	1	7	10	6	1	4
31st March, 1914	.. 389	243	24	3	13	14	4	5	11	9	4	3

A. G. MICHAELIAN,

General Manager.

## STATEMENT No. 2.

Name of Senior Sheep Inspector.	Names of Districts under his control.	No. of area.
W. L. Currie .. ..	Albany, Alexandria, Bathurst, Knysna, Humansdorp, Peddie, Somerset East, Steytlerville, Uitenhage, Port Elizabeth, Jansenville.	4
F. P. Fincham .. ..	Aliwal North, Albert, Maraisburg, Molteno, Queenstown, Steynsburg, Tarka.	6
S. Keightley .. ..	Bedford, Cathcart, Cradock, Fort Beaufort, King William's Town, East London, Komgha, Stockenström, Stutterheim, Victoria East.	5
J. C. Froneman .. ..	Barkly East, Elliot, Herschel, Glen Grey, Wodehouse.	7
W. Cronwright .. ..	Britstown, Philipstown, Colesberg, Middelburg, Hanover, Richmond, Victoria West.	9
W. J. v.d. Merwe .. ..	Aberdeen, George, Graaff-Reinet, Mossel Bay, Murraysburg, Pearston, Oudtshoorn, Willowmore, Uniondale.	3
P. J. de Wet (Griquatown)	Hay, Herbert, Hopetown, Kimberley, Prieska.	11
C. R. van Heerden .. ..	Gordonia, Kenhardt .. .. .	12
C. A. Wilson .. ..	Beaufort West, Ceres, Laingsburg, Prince Albert, Sutherland, Worcester, Clanwilliam.	2
P. A. Steenekamp .. ..	Namaqualand, Van Rhynsdorp .. ..	10
R. P. de Wet .. ..	Calvinia, Carnarvon, Fraserburg .. ..	8
P. J. de Wet (Cape Town)	Bredasdorp, Caledon, Cape, Paarl, Stellenbosch, Malmesbury, Montagu, Robertson, Riversdale, Piquetberg, Tulbagh, Swellendam, Ladismith.	1
G. Venter .. ..	Barkly West, Mafeking, Kuruman, Taungs, Vryburg.	13
B. S. King .. ..	Macleary, Mount Ayliff, Mount Currie, Mount Fletcher, Mount Frere, Matatiele, Qumbu, Tsolo, Umzimkulu.	15
H. F. Brown .. ..	Bizana, Elliotdale, Flagstaff, Libode, Lusikisiki, Mquanduli, Ngqeleni, St. Johns, Tabankulu, Umtata.	16
F. J. Fuller .. ..	Butterworth, Engecobo, Idutywa, Kentani, Ngamakwe, St. Marks, Tsomo, Willowvale, Xalanga.	14
D. S. Lubbe .. ..	Bethuile, Boshof, Edenburg, Fauresmith, Jacobsdal, Philippolis, Rouxville, Smithfield.	17
T. H. Cousins .. ..	Bloemfontein, Ficksburg, Hoopstad, Ladybrand, Senekal, Thabanchu, Wepener, Winburg.	18
G. Murray .. ..	Bethlehem, Frankfort, Harrismith, Heilbron, Kroonstad, Lindley, Vrede, Vredefort.	19
C. J. Brits .. ..	Barberton, Carolina, Ermelo, Piet Retief, Standerton, Wakkerstroom, Bethal, Lydenburg.	23
P. R. Viljoen .. ..	Heidelberg, Krugersdorp, Middelburg, East Rand.	22
F. P. Jacobsz .. ..	Bloemhof, Lichtenburg, Marico, Potchefstroom, Rustenburg, Wolmaransstad.	20
L. Badenhorst .. ..	Pretoria, Waterberg, Zoutpansberg, Pietersburg.	21
J. C. Emmett .. ..	Klipriver, District (excluding Ward Klipriver), Utrecht, Paulpietersburg, Vryheid, Zululand.	24
H. J. Blignaut .. ..	Alexandra, Alfred (including Lower Umzimkulu), Pietermaritzburg (including Camperdown, Ixopo, Isolela, Impendle, Lions River, New Hanover, Pietermaritzburg, Richmond, Umgeni), Ward Klipriver, Umvoti (including Krantz Kop), Victoria (including Inanda, Lower Tugela, Mapumulo), Durban, Weenen (including Estcourt, Bergville, Impofana).	25



## STATEMENT No. 3.

SHOWING AREAS AND ADDRESSES OF THE SHEEP AND WOOL EXPERTS IN THE UNION.

Name.	Address.	No. of Area.	Districts of which area comprised.
<i>Senior Sheep and Wool Experts.</i>			
C. Mallinson ..	Sheep Division, Union Buildings, Pretoria.	—	Those mentioned in Areas No 6, 7, 8, 9, 10.
J. F. McNab ..	P.O. Box 228, Bloemfontein, O.F.S.	—	Those mentioned in Areas No. 1, 2, 3, 4, 5.
<i>Sheep and Wool Experts.</i>			
W. M. McKee	Queenstown ..	1	Transkei Territories, Wodehouse, Elliot, Maclear, Glen Grey, Queenstown, Cathcart, Stutterheim, Stockenström, Fort Beaufort, Victoria East, King William's Town, Peddie, East London.
E. V. Goddefroy	Worcester ..	2	Cape, Paarl, Stellenbosch, Malmesbury, Tullaghl, Piquetberg, Clanwilliam, Van Rhynsdorp, Calvinia, Namaqualand, Port Nolloth, Kenhardt, Carnarvon, Fraserburg, Beaufort West, Sutherland, Prince Albert, Ladismith, Ceres, Worcester, Robertson, Montagu, Caledon, Bredasdorp, Swellendam, Riversdale.
P. S. Taylor	Steynsburg ..	3	Prieska, Britstown, Victoria West, Riehlmond, Hanover, Colesberg, Albert, Steynsburg, Molteno, Tarka, Middelburg, Cradock, Graaff-Reinet.
A. V. M. Suter	P.O. Box 228, Bloemfontein, O.F.S. ..	5	Philippstown, Hope town, Bethulie, Rouxville, Edenburg, Philippolis, Fauresmith, Jacobsdal, Wepener, Smithfield, Aliwal North, Hersehel, Barkly East.
A. M. Spies ..	P.O. Box 228, Bloemfontein, O.F.S. ..	6	Griqualand West, Boshoff, Bloemfontein, Thaba'Nehn, Ladybrand, Winburg.
E. N. Roberts ..	Bethlehem ..	7	Ficksburg, Senekal, Vrede, Heilbron, Bethlehem, Harri-smith, Frankfort, Lindley.
G. J. Schuurman	Christiana .. ..	8	Kroonstad, Bothaville, Vredefort, Hoopstad, Beehuana-land, Bloemhof, Wolmaransstad, Potchefstroom, Klerksdorp, Lichtenburg, Marico, Rustenburg, Pretoria, Krugersdorp, Waterberg, Zoutpansberg.
J. J. McCall ..	Pietermaritzburg ..	10	Natal and Griqualand East.
R. B. Pickles	Ermelo .. ..	9	Heidelberg, Standerton, Bethal, Barberton, Wakkerstroom, Ermelo, Carolina, Piet Retief, Middelburg, Lydenburg.
Vacant ..	—	4	Bathurst, Albany, Alexandria, Bedford, Somerset East, Jansenville, Steytlerville, Uitenhage, Port Elizabeth, Humansdorp, Willowvale, Aberdeen, Murraysburg, Uniondale, Knysna, Oudtshoorn, George, Mossel Bay.

## STATEMENT No. 4 (SUMMARY).

SHEWING for the different Provinces of the Union, the total number of Small Stock, Losses from Disease, Losses from Drought, Increase or Decrease in Small Stock, Percentage of Infection, Number of Dipping Tanks, Stock Dipped by Inspectors, Number of Prosecutions, Amount of Fines, etc.

Provinces and Territories.	Total Number of Flocks.	SHEEP AND GOATS.			LOSSES FROM DISEASE.				
		Woolled.	Non-Woolled.	Angora.	Others.	Total number of Small Stock.	Sheep.	Goats.	Total number of Small Stock.
Cape Proper .. .. .	61,558	10,406,804	4,726,349	3,405,062	2,930,234	21,468,449	401,701	129,439	531,140
Bechuanaland .. .. .	6,646	403,376	428,259	39,218	430,157	1,330,010	57,673	20,737	78,410
Transkei .. .. .	11,576	475,824	—	98	175,081	651,003	27,269	12,944	40,213
Tembuland .. .. .	14,074	875,385	12,569	21,500	226,448	1,135,902	75,912	20,240	96,152
Griqualand East .. .. .	14,198	1,029,932	12,536	80,340	249,588	1,372,396	60,599	18,118	78,717
Pondoland .. .. .	12,985	205,444	9,226	—	156,186	370,856	39,871	39,210	79,081
Grand Total for the Cape Province									
1913 .. .. .	121,037	13,396,765	5,188,939	3,546,218	4,196,694	26,328,616	663,025	240,688	903,713
1912 .. .. .	124,694	13,239,067	6,022,147	3,668,581	4,473,200	27,402,995	—	—	—
Transvaal—1913 .. .. .	41,071	3,797,395	1,220,563	225,458	1,752,351	6,996,767	185,332	56,978	242,310
.. .. . 1912 .. .. .	41,026	3,098,785	1,206,251	189,747	1,665,628	6,160,411	—	—	—
Orange Free State—1913 .. .. .	28,554	9,467,728	712,725	341,691	275,422	10,797,566	263,067	6,300	269,367
.. .. . 1912 .. .. .	30,012	9,409,656	1,034,266	459,109	345,154	11,248,176	—	—	—
Natal—1913 .. .. .	30,036	1,543,705	275,279	78,386	820,966	2,718,336	45,995	9,144	55,139
Zululand 1912 .. .. .	11,487	122,314	82,587	2,131	165,709	372,741	413	45	458
Grand Total for Natal—1913 .. .. .	41,523	1,666,019	357,866	80,517	986,675	3,091,077	46,408	9,189	55,597
.. .. . 1912 .. .. .	30,491	1,583,659	295,090	77,673	812,079	2,768,501	—	—	—
GRAND TOTAL FOR THE UNION—									
1913 .. .. .	232,185	28,327,907	7,480,093	4,194,884	7,211,142	47,214,026	1,157,832	313,155	1,470,987
1912 .. .. .	226,223	27,331,167	8,557,754	4,395,101	7,296,061	47,580,083	—	—	—

## STATEMENT No. 4 (SUMMARY)—continued.

Provinces and Territories.	LOSSES FROM DROUGHT.					INCREASE OR DECREASE AS COMPARED WITH THE YEAR 1912.				
	SHEEP.		GOATS.		Total number of Small Stock.	SHEEP.		GOATS.		Total Increase or Decrease in Small Stock.
	Woolled.	Non-Woolled.	Angora.	Others.		Woolled.	Non Woolled.	Angora.	Others.	
Cape Proper .. ..	172,284	197,869	54,064	52,448	476,665	+ 3,345	— 824,774	— 134,552	— 253,431	— 1,209,412
Bechuanaland .. ..	7,367	12,008	461	8,904	28,740	+ 169,323	— 13,498	+ 6,602	+ 28,697	+ 191,124
Transkei .. ..	—	—	—	—	—	— 3,097	— 1,249	+ 85	— 20,920	— 25,181
Tenbuland .. ..	6,850	195	235	901	8,181	+ 21,599	+ 1,692	— 209	+ 5,323	+ 28,405
Griqualand East .. ..	978	2	190	600	1,770	+ 6,911	+ 2,160	+ 5,733	— 15,162	— 358
Pondoland .. ..	4,050	—	—	3,350	7,400	— 40,383	+ 2,461	— 22	— 21,013	— 58,957
Grand Total for Cape Province ..	191,529	210,074	54,950	66,203	522,756	+ 157,698	— 833,208	— 122,363	— 276,506	— 1,074,379
Transvaal .. ..	28,364	6,261	8,815	11,774	55,214	+ 698,610	+ 14,312	+ 36,711	+ 86,723	+ 836,356
Orange Free State ..	214,085	22,724	3,167	2,844	242,820	+ 58,072	— 321,541	— 117,409	— 69,732	— 450,610
Natal .. ..	28,051	1,470	1,498	2,844	33,863	+ 41,892	+ 59,524	+ 1,671	+ 200,379	+ 303,466
Zululand .. ..	—	—	—	—	—	+ 40,468	+ 3,252	+ 1,173	— 25,783	+ 19,110
Grand Total for Natal ..	28,051	1,470	1,498	2,844	33,863	+ 82,360	+ 62,776	+ 2,844	+ 174,596	+ 322,576
GRAND TOTAL FOR THE UNION ..	462,029	240,529	68,430	83,665	854,653	+ 996,740	— 1,077,661	— 200,217	— 84,919	— 366,057



## STATEMENT NO. 4 (SUMMARY)—continued.

Provinces and Territories.	Sheep and Goats under order to cleanse on 31st December, 1913.			Sheep and Goats quarantined during the period of 6 months from 1/7/13 to 31/12/13.			Total number of Permanent and Portable Dipping Tanks.	Number of Dipping Tanks provided during the year 1913.
	Flocks.	Percentage of infected flocks.	Sheep and Goats.	Percentage of infected sheep and goats.	Flocks.	Percentage of infected flocks.	Sheep and Goats.	Percentage of infected sheep and goats.
Cape Proper .. ..	643	1·04	326,578	1·52	5,056	8·21	2,397,025	11·16
Bechuanaland .. ..	165	2·48	63,711	4·79	725	10·91	229,841	17·28
Transkei .. ..	85	0·73	10,462	1·61	668	5·77	69,796	10·71
Tembuland .. ..	139	0·99	20,833	1·83	967	6·87	120,820	10·64
Griqualand East .. ..	198	1·39	42,219	3·08	736	5·18	173,284	12·63
Pondoland .. ..	491	3·78	27,258	7·35	549	4·23	34,960	9·43
Grand Total for the Cape Province .. ..	1,721	1·42	491,061	1·86	8,701	7·19	3,025,636	11·49
Transvaal .. ..	153	0·37	53,283	0·76	2,924	7·11	793,081	11·33
Orange Free State .. ..	264	0·92	151,185	1·40	2,654	9·29	1,154,784	10·70
Natal .. ..	145	0·48	32,104	1·18	1,356	4·51	354,444	13·04
Zululand .. ..	13	0·11	1,631	0·44	213	1·85	41,726	11·19
Grand Total for Natal .. ..	158	0·38	33,735	1·09	1,569	3·78	396,170	12·82
GRAND TOTAL FOR THE UNION	2,296	0·99	729,264	1·54	15,848	6·83	5,369,671	11·37
							32,226	2,909

STATEMENT No. 4 (SUMMARY)—continued.

Provinces and Territories.	No. of Inspectors in Provinces.	Stock Dipped under supervision of Inspector from 1/7/13 to 31/12/13.		No. of Stock lost through Dipping.	No. of Prosecutions.				Amount of Fines.		No. of Convictions.
		Flocks.	Sheep and Goats.		Failure to Cleanse.	Wilful Removal.	Failure to Report.	Other Causes.	£	s. d.	
Cape Proper .. ..	143	10,980	3,504,560	137	102	114	329	41	2,035	6 0	510
Bechuanaland .. ..	13	248	51,048	38	9	3	77	2	278	0 0	75
Transkei .. ..	11	12,475	705,520	11	3	2	54	15	138	15 0	62
Tembuland .. ..	15	12,381	757,200	29	23	25	141	23	558	15 0	191
Griqualand East .. ..	21	10,525	718,307	69	33	23	144	32	359	5 0	206
Pondoland .. ..	11	13,316	422,144	7	54	5	40	15	161	5 0	100
Grand Total for the Cape Province .. ..	214	59,925	6,158,779	291	224	172	785	128	3,531	6 0	1,144
Transvaal .. ..	82	1,545	127,515	104	59	21	246	36	1,193	15 0	320
Orange Free State .. ..	50	705	288,910	166	48	56	164	27	1,202	15 0	245
Natal .. ..	25	3,561	210,018	12	30	26	125	8	514	10 0	174
Zululand .. ..	4	6,696	159,679	—	3	6	1	1	102	0 0	11
Grand Total for Natal .. ..	29	10,257	369,697	12	33	32	126	9	616	10 0	185
GRAND TOTAL FOR THE UNION .. ..	392	72,432	6,944,901	573	364	281	1,321	200	6,544	6 0	1,894

## APPENDIX III.

## VETERINARY RESEARCH.

## ANNUAL REPORT, 1913-14.

## ROUTINE WORK.

## 1.—MICROSCOPICAL AND PATHOLOGICAL ANATOMICAL EXAMINATIONS.

The number of specimens and smears examined at the three Laboratories amounted to 11,154, viz., 6,237 in Onderstepoort, 787 in Grahamstown, and 4,130 in Pietermaritzburg. A positive diagnosis was arrived at in 2,911 cases, or 26 per cent. of all examinations. Amongst these 2,911 positive results, the following are the principal items:—

- 698 cases of East Coast Fever, or complications, representing 6 per cent. of the total number examined;
- 494 cases of Redwater, or complications, representing 4 per cent. of the number examined;
- 311 cases of Anæmia (a probable sequel of Redwater), representing 3 per cent. of the total number examined;
- 316 cases of Anaplasmosis (*Anaplasma marginale*, Gall-sickness) and complications, representing 3 per cent. of the total number examined;
- 400 cases of Anthrax, representing 4 per cent. of the total number examined;
- 150 cases of Black Water, representing 1 per cent. of the total number examined;
- 91 cases of Tuberculosis, representing 1 per cent. of the total number examined.

Out of the total number of smears received, 405 were too decomposed for diagnosis, leaving the total negative results amounting to 7,838, or 70 per cent. The percentage of negative results to total smears examined in Onderstepoort, Grahamstown and Pietermaritzburg was 72 per cent., 77 per cent. and 68 per cent. respectively. These negative results require some comment. In the majority of cases they refer to smears taken from sick or dead cattle, and a diagnosis of the disease, or the cause of death, was not possible in this case. This means that of every 100 cattle that sickened or died, we were not able to form an opinion as to the nature or cause of the disease in 70 cases. Only in the minority of cases were these smears obtained by Government Veterinary Surgeons and forwarded with an accurate description, both of symptoms and *post-mortem* lesions. The greatest number was sent in by the police or by the farmers themselves, with but meagre notes, not giving sufficient data to form an opinion. From the reports of the Government Veterinary Surgeons it appears that in a number of cases death was apparently due to Lamziekte, and in localities where the disease was not expected; vegetable poisoning appears to be responsible for another number of deaths. This state of affairs is not quite satisfactory from our point of view. We ought to know what cattle die from, and this can only be done by careful *post-mortem* examinations by veterinary surgeons, accurate descriptions of symptoms, and collection of material from the dead animal in a systematic manner, which material could be worked up in the laboratory. Owing to the limited number of both Government Veterinary Surgeons and Veterinary Research Officers, this cannot be done as yet.

## 2.—INOCULATION OF HORSES AGAINST HORSE-SICKNESS.

At the end of the 1913 Horse-sickness season an inquiry was made into the mortality amongst horses, which had been inoculated in the years 1911-12, 1912-13, and which had now been exposed for one and two seasons. The total number of exposed horses amounted to 769, of which 399 were inoculated in 1911-12, and 370 in 1912-13.



The returns showed a total mortality of 3.6 per cent. from breakdowns in immunity. From the information collected as to the severity of the disease in the districts concerned it appeared that the mortality amongst non-immunised horses was a severe one. This was particularly the case in Barberton. It has also been reported that naturally salted horses succumbed to the disease, which is considered to be a certain indication of the severity of an outbreak of Horse-sickness. Considering this fact, the mortality in inoculated horses must be considered a small one. By our method we cannot expect to convey more immunity to a horse than natural recovery from Horse-sickness conveys, and therefore a certain mortality must be expected, depending on the individuality of the horse and the virulency of the epizootic, which latter changes in different localities, and in different years.

In 1913-14 no horses were inoculated. On comparing the death rate of 14.5 per cent. during 1912-13, as the result of inoculation, with that of 10.3 per cent. noticed in the previous year and of 10 per cent. under the condition of the laboratory, it was thought necessary to first inquire into the cause of this. Whilst this was being done the observation was made that in addition to Horse-sickness and Biliary Fever (the diseases we were familiar with hitherto), there was a third one, the so-called Pernicious Anaemia of the European workers, or the Swamp Fever of the Americans. The peculiarity of this disease is that horses, apparently recovered, still contain the virus in their blood. Since in our Horse-sickness inoculation we require blood of immune horses, and such immune horses might have been affected with Pernicious Anaemia (when their blood would have been instrumental in propagating the disease), I had to stop the issue of all serum, pending investigation into ways and means as to its prevention. So far it appears that the only safe way to prevent its introduction with the serum is to keep the serum horses under prolonged observation. Microscopical examination of the blood unfortunately does not allow of a diagnosis. We shall also have to ascertain how long a given blood retains its virulency when removed from a horse. It may be possible that it loses its virulency after a definite time, when such serum could be used without danger.

#### *Blue-tongue.*

At the end of the year 1912, and at the beginning of 1913, reports reached the laboratory that the inoculation of sheep (for the purpose of which 657,948 doses had been issued in the year 1912) was followed in a great many instances by breakdowns of immunity. A circular was issued to all farmers, who had been supplied with the vaccine, asking for information. Particulars were obtained concerning 188,378 sheep, of which 4,416 were reported to have died after inoculation from naturally acquired Blue-tongue; in other words, which had broken down in immunity. This would amount to 2.4 per cent. of the number under observation. The heaviest mortality seems to have occurred in the Ladysmith District, where 7.1 per cent. were reported to have died. A number of farmers thought that the vaccine which had been supplied had been weaker than that of former years.

From the inquiry it appeared, however, that as the result of inoculation 647 sheep had died (0.35 per cent.), thus showing that at least not all vaccine was avirulent. In a number of cases we were able to obtain some of the vaccine used, and it was tested on its virulency on sheep of the laboratory, with the result that whilst some of it proved to be still virulent, some of it no longer gave a reaction. We have therefore to admit the possibility that not all the vaccine was virulent. This fact is somewhat difficult to understand. Under ordinary conditions Blue-tongue vaccine keeps its virulency for over a year; it is possible that this is not always the case, and hence some breakdowns can be explained in this way.

The vaccine is obtained from a sheep at a time when it undergoes a reaction. Only sheep with distinct reactions are selected. It is possible that in some cases the blood of such sheep was not virulent. In the instances, however, where sheep showed distinct reactions to Blue-tongue from the inoculation, only one explanation is possible, viz., that the immunity conveyed by the inoculation did not protect against a natural infection. This fact is not without its parallel in Horse-sickness, Redwater, Heartwater and even in the oldest method of inoculation, the vaccination of men against Variola (Smallpox), where similar facts are recorded.

The necessary conclusions have, however, been drawn out of this year's experience, and as far as the first mentioned points are concerned steps have been taken to overcome them. This has been done by mixing the vaccine of a

greater number of sheep, when more uniformity and constancy of virulency will be obtained.

In the season 1913-14, 971,390 doses were issued. This is a record so far, and it shows that whatever may have been the cause of failure in the previous season, the confidence in the vaccine was not lost.

In two instances reports were received as to a rather severe reaction, due to the inoculation of this new vaccine. One instance can possibly be explained, as the sheep were worm infected at the time, the diagnosis being arrived at from the anæmic condition of the blood, which showed lesions identical with those found in worm infection. The second complaint was to the effect that the recovered sheep had lost condition as a result. Loss of condition, as a rule, follows the inoculation, owing to the sheep undergoing febrile reactions, and for this reason we recommend inoculation early in the season, so that the sheep would be able to pick up again, and be in good condition before the advent of winter. Notwithstanding our instructions, some farmers will inoculate late in the year, and although we have not refused to issue the vaccine we warn them against such a practice.

#### *Inoculation Against Redwater and Gallsickness.*

The issues during the year under discussion were as follows:—

Pretoria	...	...	...	7,884	doses
Grahamstown	...	...	...	6,377	„
Pietermaritzburg	...	...	...	1,599	„
Total				15,860	„

Generally speaking, the results obtained are not constant. This is due to the delicate nature of the virus and its preparation. Virus is obtained from an animal which has passed through a mild attack of Redwater and Gallsickness, and whose blood acts as a virus. It keeps its virulency only for a few days, and is easily influenced by outside conditions. Reports were received which show that

- (1) Inoculation does not always take, and accordingly no immunity is obtained;
- (2) That notwithstanding a reaction, breakdowns occur;
- (3) That the inoculation produces too severe reactions.

All these observations can be explained. I have already referred to the virus losing its virulency rapidly, which is one of the reasons the inoculation does not take, and this was noticed when virus had to be sent long distances and during the hottest times of the year. But it also occasionally happens that the blood used for the vaccine at the time of taking does not contain the virus, or that it becomes attenuated in the animal in the course of time. It is the practice to test the virulency from time to time, on freshly imported cattle, or on calves locally born and kept tick free. The former practice had to be discontinued for some time: the latter is not quite satisfactory and is open to errors, since calves react so mildly to Redwater, that the reaction can be missed, both by microscope and by thermometer. A further fact has been noted, that not all the cattle react to one and the same virus; in fact sometimes only a few do so. In order to overcome some of these difficulties, applicants who received virus were supplied with glass slides, and asked to make smears at intervals after inoculation, to enable us to control the presence or absence of the blood parasites or lesions produced by them, which might allow of an opinion being formed as to whether an animal has passed through a reaction or not; a second inoculation was advised when the first one failed.

The observation was made in some instances that notwithstanding a reaction, and the presence of other clinical symptoms, breakdowns of immunity occurred: this was more so on the coastal area of Natal and in the low veld of the Transvaal. Microscopical examination corroborated the diagnosis in some instances, whilst in others it did not. These breakdowns can be due to two causes, either to a stronger virus than the one utilised for immunisation, or to a concurrent disease, which lowers the defence of the system to such an extent that the parasites then present in the blood in a latent state recover activity and multiply, the symptoms of the disease being overshadowed by the lesions of Redwater or Gallsickness. This accompanying disease is in most instances Heartwater.



In order to find out to what extent natural breakdowns occur, experiments were arranged for on a farm near Stanger, Natal, and will be discussed in my next report. In future, to overcome this difficulty of a stronger virus, it will be necessary to inoculate the cattle intended to be exposed in such areas with a local virus, when a better immunity might then result.

With reference to the complaint that the reactions are too severe, a distinction must be drawn between Redwater and Gallsickness reactions. The first one follows usually within 20 days, the second one from 25 to 45 days. The former is due to *Piroplasma bigeminum* and the latter to *Anaplasma marginale* var. *centrale*.

Although the strain utilised for the purpose is of a mild virulency, yet severe reactions are noticed occasionally, which are undoubtedly due to individual susceptibility. This Redwater reaction can, however, be successfully checked by the injection of Trypan blue, and on the use of this drug the success depends to a great extent. Deaths from Redwater, due to inoculation checked by the use of Trypan blue, are exceptional.

The fact that complaints reach us that cattle die from Redwater reactions shows that the precaution of injecting Trypan blue is either not resorted to or else it is not made use of early enough. Complaints that the Gallsickness reactions were too severe and caused the death of some animals (both imported and South African born) were also received.

The Gallsickness reaction, which must immunise against the natural disease, is due to a less virulent variety of *Anaplasma marginale*, viz., *A. centrale*. This reaction has been so mild that during the several years this inoculation has been in use no deaths have occurred.

Deaths resulting from Gallsickness came therefore as a surprise. It was found that in these instances the virulent form of Anaplasmosis (*Anaplasma marginale*) was responsible, and this might either be due to a natural infection of the vaccine animal, or due to a reversion of the virus to its original virulency. The issue of the vaccine from the animal responsible was accordingly discontinued.

### 3.—ANTHRAX VACCINE.

The number of doses issued during the year under observation amounts to 108,106 double doses. The distribution of the vaccine was as follows:—

Onderstepoort	...	...	...	43,800	doses
Grahamstown	...	...	...	61,331	„
Pietermaritzburg	...	...	...	2,975	„

This considerable increase must be due to an increase of the disease, and may be connected somewhat with the dry weather, a condition which also seems to favour the prevalence of Blackwater. It is possible that the correct diagnosis by means of the microscope has helped to locate the disease, which formerly was mistaken for others.

The vaccine is made in Paris, under the control of the Institut Pasteur. We have several times received complaints to the effect that the immunity conveyed by the vaccine broke down soon after inoculation, or that no immunity at all was conveyed. This information has been communicated to the makers, who suggested that, provided the inoculation was carried out properly, and that the vaccine had not lost virulency during transit, that the strength of it might be increased. Such more virulent material has been obtained and issued. At the time of reporting no results have as yet come to hand.

### 4.—BLACK WATER VACCINE.

The total number of doses issued amounts to 197,450, the distribution being as follows:—

Onderstepoort	...	57,760	single doses:	75,810	double doses
Grahamstown	...	13,530	„	32,340	„
Pietermaritzburg	...	17,320	„	690	„

Double inoculation is generally recommended.

Reports as to breakdowns of immunity are sometimes obtained, but it is difficult to put these down to inefficient virus. The virus is prepared in large batches of 20,000 to 30,000 doses at a time. Each batch is tested before issue, and the immunity then conferred is controlled by virulent material of full



strength. The vaccine is only issued when the tests are satisfactory, and accordingly there must be local reasons for failures. The method of inoculation has some technical difficulties, which may result in the animal not receiving the vaccine at all, or only partially. Apart from this, differences in virulency of the strain do exist, and accordingly also variations in immunities have to be expected. There remains, however, the fact that notwithstanding the best of vaccine and the best of methods, some animals break down; not all animals can be rendered immune against the disease. This is no peculiarity of Quarter-evil, and it can be noted in all other diseases, in some more and in others less frequently.

#### 5.—INOCULATION OF MULES AGAINST HORSE-SICKNESS.

The issues of serum during the year amounted to 1,374 doses, distributed as follows:—

Transvaal Province	...	...	429	doses
Cape Province	...	...	183	,,
Natal	...	...	482	,,
Rhodesia	...	...	270	,,
Swaziland	...	...	10	,,
				<hr/>
				1,374
				<hr/>

In the Union 1,052 mules were inoculated, with a loss of 47 or 4.5 per cent.

#### 6.—MALLEIN.

In the early part of the financial year Mallein was prepared at the Grahams-town Laboratory until the transfer of Mr. Robertson to Onderstepoort as Assistant Director, in September, 1913.

The issues during the year amounted to 5,811 doses, a decrease of over 9,000 doses as compared with the previous year.

#### 7.—TUBERCULIN

This material is imported from England, and during the year under review 13,830 doses were issued, being a slight increase on the amount supplied during the previous year.

#### 8.—ANTI-VENENE.

This material is prepared at the Allerton Laboratory and is put up in two forms, the issues being as follows:—

Polyvalent Anti-Venene	...	...	176	doses
Puff Adder Anti-Venene	...	...	48	,,

#### *Vaccine Lymph.*

During the financial year 430,050 doses were supplied, this being a slight decrease on the issues during the previous twelve months.

It is proposed to discontinue the preparation of Smallpox Vaccine, Anti-Venene, as well as Rabies Vaccine, under our care. These being preparations relating to diseases affecting men, the preparation of them should be handed over to the care of the Public Health Department.

#### 9.—DIPPING OF CATTLE.

For some time past it has been the practice to arrange for cattle belonging to private owners to be dipped in the tank at the Laboratory, Allerton, and during the past year the number of cattle that passed through the tank amounted to 2,758.

#### 10.—STAFF.

I was still on leave in Europe at the commencement of the financial year and returned to South Africa at the end of September, relieving Mr. W. Robertson, who had been carrying out the duties of Director of Veterinary Research during my absence in Europe. I regret having to report that Mr.

Robertson's health broke down as a result of his stay at Onderstepoort, and his medical advisers considered it essential that he should live at lower altitude. He was therefore transferred to Grahamstown, and I am glad to say that at the end of the year his health had undoubtedly improved.

Several changes occurred amongst the personnel of the staff, amongst which I may mention the resignation of Mr. G. N. Hall, M.R.C.V.S., who accepted an appointment in British East Africa; the appointment of Mr. E. M. Robinson, M.R.C.V.S., in December, 1913, followed by the arrival of Mr. G. de Kock, M.R.C.V.S., a month later, the second of the 1909 South African scholarship students to qualify in veterinary surgery. At the end of January, Mr. H. H. Green, the newly-appointed Biological Chemist, arrived, followed two months later by Professor E. Hedinger, the Consulting Pathologist for Lamziekte investigations. I must also refer to the loss the Division sustained owing to the resignation of Mr. A. W. Shilston, M.R.C.V.S., who was offered the appointment of Assistant Bacteriologist in Muktesar, India. Mr. Shilston joined the Natal service in 1909 as Assistant to Lieut.-Col. H. Watkins Pitchford, and from the time the latter left the service in 1912 Mr. Shilston had been in charge of the Allerton Laboratory. It is to be greatly regretted that the Public Service Commission would not at first accord this officer the same treatment as given to other pre-Union officers, and there is no doubt whatever that had their final offer been made in the first place Mr. Shilston would not have accepted the Indian appointment.

Mr. D. T. Mitchell, M.R.C.V.S., went on vacation and study leave in September, 1913, and Mr. J. Walker, M.R.C.V.S., was transferred from Grahamstown to Pretoria the following month.

#### 11.—CORRESPONDENCE.

The amount of correspondence dealt with shows a steady increase, year by year, and the figures relating to the period under review are as follows:—

	Letters and Telegrams.	
	Received.	Despatched.
Onderstepoort .. .. .	15,859	20,526
Grahamstown .. .. .	2,211	2,765
Pietermaritzburg .. .. .	3,731	2,926
	21,801	26,217

The difference between the number of letters and telegrams received as compared with the number despatched is due to the necessity of sending telegrams in respect of all specimens examined, such telegrams being subsequently confirmed by letter.

#### 12.—PUBLICATIONS.

In the *Union Agricultural Journal* for October, 1913, Mr. W. Robertson published an article on Lamziekte in cattle, and the following month Mr. A. W. Shilston contributed a preliminary report on the preparation of the caustic soda and sulphur dip. An article on Dun-sickness was sent to the *Farmers' Weekly* by myself in the early part of 1914, and a few lectures were given at different farmers' meetings.

#### 13.—FINANCE.

The revenue of the Division during the year amounted to £13,771, whilst the expenditure totalled £50,025; in the previous year the figures were £9,000 and £52,266 respectively. The nett expenditure accordingly being £36,254 in 1913-14 as compared with £45,266 in 1912-13.

## (b) RESEARCH.

## 1.—TUBERCULOSIS IN HOGS.

For some time past our attention has been drawn to the fact that a number of pigs slaughtered in the abattoir of Johannesburg showed gland lesions, typical of Tuberculosis. The Director of the abattoir, Mr. J. Irvine Smith, was good enough to send us diseased glands for inspection. Microscopical examination showed the presence of tubercle bacilli in fresh cases, whilst in old indurated glands these could no longer be detected.

The history of the pigs from which the glands were taken pointed to these pigs coming from native kraals. Since Natives do not feed their pigs with cow milk it was surmised that the disease in pigs was due to human origin. The object of the investigation was to clear this point up, and Mr. Smith rendered all assistance in obtaining the material. It was, however, not always possible to trace the origin of the pigs. The experiment was carried out by Mr. G. Norman Hall, M.R.C.V.S., and the results were as follows:—

- (1) Three types of tuberculi were isolated: Human, bovine and avian.
- (2) In 6 instances the human type was found; in 7 cases the bovine type was isolated; and in 1 case the avian.
- (3) All these cultures were virulent.

In the majority of cases pig tuberculosis is due to infection with bovine tuberculosis: this was somewhat surprising and contrary to expectation, but could not be followed up any further, since the origin of the pigs in question could not be traced.

## 2.—CONTAGIOUS ABORTION.

For a considerable time the opinion was held in South Africa that the abortion of cows, noticed occasionally in an enzootic nature, was identical with that of Europe. In order to elucidate this question, and at the same time in order to introduce the modern tests for diagnosing the disease, investigations were undertaken.

Thanks to the knowledge gathered in England and elsewhere it was a comparatively easy matter to obtain and isolate in pure cultures the bacillus of contagious abortion, from the stomach of aborted calves. For the sake of comparison cultures have been obtained both from England and Germany. To ascertain their identity use was made of the agglutination test. It was found that the serum of the animal which aborted in South Africa agglutinated English and German cultures, and that serum of animals obtained in response to the inoculation of English and German bacilli agglutinated the South African cultures. There was accordingly no longer any doubt as to the identity of the disease. Once this fact had been established the method of agglutination was added to the routine work of the laboratories, for the purpose of diagnosing the disease in practice. Instructions were issued how to collect the material, which is principally done by Government Veterinary Surgeons. The method was not only used to diagnose the disease, but also to separate infected from healthy cattle, and in this way to arrest the spread of the disease in a herd.

The investigation into contagious abortion was started by Mr. Hall, and, after his departure, continued by Mr. P. R. Viljoen.

## 3.—CHICKFEVER IN OSTRICHES.

Considerable attention was given to the study of the cause of mortality in newly-hatched ostrich chicks, known as Chickfever or Yellow-liver. The latter name is derived from the colour of the liver in young birds, which is of a normal appearance, hence it is a misnomer for the disease.

The cause of at least some of the mortality, and perhaps of the greater part, was found to be due to the presence of a fungus, *Aspergillus fumigatus*, in the lungs. At a later period other fungi, viz., *Aspergillus*, *Asper*, and *Aspergillus* nearest to *Niger* were found to be pathogenic for birds, but the experiment showed distinctly that *Aspergillus fumigatus* is the main source of the infection known as Chickfever. This *Aspergillus* is found in the airsacs of the lungs, where in the majority of cases it produces small nodules. In cases where these are not present the mycelium can be traced in the lung tissue. The disease can



easily be produced artificially by blowing spores into the windpipe. Both young and old birds are susceptible when so infected; the chicks, however, are so susceptible that in experiment hardly any recover. They show the symptoms known as Chickfever. Under natural conditions the presence of *Aspergillus* can be shown almost anywhere where organic substances decompose, and especially on mouldy straw and bedding, sacks, green food, etc. This disease can even be contracted in the incubator, and it was found that *Aspergillus* penetrates the eggshell and grows in the air chambers in the inner surface of the shell. It is probably, however, more frequently contracted directly after hatching, when the chicks are placed in a box or bed on mouldy litter. This could be demonstrated experimentally by pouring *Aspergillus* spores on sterilised litter and placing chicks into the box overnight. Invariably they contracted the disease and died, whereas control chicks bedded on sterilised straw never took it. Finally, experiments were made with straw obtained from a farmer which he utilised for bedding his chicks on. All chicks placed on this straw during the night contracted Chickfever and died.

The prevention of Chickfever lays therefore in not placing eggs or chicks in contact with mouldy material.

These experiments were started by Mr. J. Walker, at Grahamstown, and were repeated at Onderstepoort.

#### 4.—PERNICIOUS ANÆMIA IN HORSES.

The existence of this disease was discovered quite accidentally. During the Horse-sickness season a number of horses immunised against Horse-sickness had been reported to have died from relapses or breakdowns in immunity.

In most instances samples of blood, which had been asked for, were sent to us in order to control the diagnosis. At the time of my return about 60 hyper-immunised horses were ready for disposal, and I decided to test the virus of the relapsing horses on them, in order to find out to what extent the immunity of hyper-immunised horses would fail to protect against the several viruses which were thought to be of a more virulent nature.

As a result of this test we found that virus obtained from different sources produced a reaction which was no longer typical of Horse-sickness, and that a number of horses died sooner or later after the inoculation. We therefore knew we had to deal with a disease hitherto unknown to us.

By comparing it with the literature we found that it had to be identified with the Pernicious Anæmia of European authors, and the Swampfever of the Americans.

In this disease we were able to distinguish three different forms: Acute, sub-acute and chronic.

All forms begin with an incubation period, varying from 1 to 3 weeks; rarely longer.

In the acute form the first attack leads to death, in the sub-acute form two or more attacks succeed each other, in the chronic form the attacks repeat themselves at intervals and finally the animal either dies of extreme anæmia or appears to recover.

The symptoms of the acute form are those of a very high fever, lasting for a few days or as long as 10 to 14 days, during which period the animal loses condition rapidly, the number of red corpuscles decreases, a slight jaundice develops, particularly noticeable in the eyes and mouth. On *post-mortem* examination the lesions of an acute anæmia icterus and hæmorrhagic diathesis are present with a splenic tumor.

In the sub-acute case the symptoms develop with every fresh attack and diminish in the intervals. Finally one of the attacks kills the animal. *Post-mortem* symptoms are identical, although the jaundice and anæmia are perhaps more pronounced.

In the chronic cases, with a number of relapses, the animal succumbs to debility. *Post-mortem* lesions are not so typical, anæmia being the principal symptom.

Pernicious anæmia is due to an ultra-visible micro-organism, and can be transmitted from the infected animal by inoculation of blood or serum of such horses. Drenching also gives identical results. From literature it appears that no recoveries are observed. Such horses retain the infection in their blood and remain a constant source of infection. It is this fact which interferes with our Horse-sickness inoculation.

The distribution of the disease in South Africa is not clear, as hitherto nobody has diagnosed or even suspected its presence.

It is necessary that more experimental investigations are carried out into this disease, and these will continue to be under the care of Mr. D. Kehoe.

#### 5.—JAGZIEKTE IN SHEEP.

Considerable attention has been given to this disease by Mr. D. T. Mitchell.

Through the kindness of a farmer in the Steynsdorp District, Mr. Bekker, we were regularly supplied with material. It is, as the name indicates, an affection of the lungs, and of a chronic nature. As it appears to be limited to certain areas it had to be decided whether it was of a contagious nature or not. For this purpose sick sheep were placed with healthy ones, and the development of the disease could then be observed. The fact was then established that the disease is contagious. Experiments have borne out the further fact that for its transmission direct contact is not even necessary. Sheep placed in a pen previously occupied by infected sheep also contracted it. The contagious character once being established, attempts were made to transmit it by inoculation, but so far we have failed.

The microscopical examination so far has given negative results as to the presence of a visible micro-organism; cultures have also failed. At present we have no other recommendation for combatting this malady but to kill the infected animals, when eradication should be possible.

#### 6.—REDWATER AND GALLSICKNESS in susceptible Cattle.

When susceptible cattle are inoculated with blood of an immune Redwater Gallsickness animal observations are frequently made that no reaction occurs to Redwater and no parasites are found on microscopical examination, whilst the Gallsickness reaction invariably occurs.

It had to be decided whether such animals were really immune to Redwater, and for this purpose they were bled, their blood was injected into fresh susceptible cattle, whilst the original animals were re-inoculated with blood from another Redwater and Gallsickness animal. It was found, in the two instances investigated, that such blood when injected did not produce a reaction in susceptible cattle, whilst the suppliers of blood themselves remained susceptible to another source of Redwater. Thus it was shown that susceptible cattle do not always react to the Redwater inoculation, and it was found that such is the case even when the blood is taken at a time when Redwater parasites are frequent in the blood. It was also shown that such non-reacting animals do not acquire immunity, whilst the Gallsickness reaction always appears to put in an appearance. A re-inoculation of the animal, which failed to develop a Redwater reaction in the first instance may fail again. On the other hand, it has been noted that a second inoculation, although not producing a typical reaction, may be succeeded by the appearance of *Babesia bigeminum* in the blood. Finally, it was noted that an animal, when injected twice in succession with Redwater, may react both times to Redwater.

These observations were registered by Mr. Walker, and are of enormous practical importance, since they show the difficulties attached to the Redwater-Gallsickness inoculation.

#### 7.—INVESTIGATIONS INTO THE LIFE HISTORY OF THE OSTRICH WIRE-WORM— *STRONGYLUS DOUGLASSI*.

The investigations were undertaken to study all details of the life history of the wire-worm, in order to establish facts from which definite conclusions could be drawn, with a view to prevent infection of the birds or to eradicate the pest. For this purpose we had to undertake the breeding of ostriches at Onderstepoort. The necessary incubators were obtained and special camps were erected. This was started under the supervision of Mr. W. Robertson.

Of the bionomics of the wire-worm but little was known up to the time of investigation.

The worm had been described by Cobbold, from specimens forwarded by the late Hon. Arthur Douglas. It was known that the droppings of the infected birds contained wire-worm eggs. We were able to show, in complete analogy with the life history of *Ankylostomum duodenale* worked by Looss, of Cairo, that in the cycle of development the following stages can be distinguished: egg,



larvæ and adults. The life of the larva again can be divided into four different stages, each ending with a moulting process (ecdysis). For convenience sake we shall call them the first, second, third and fourth larval stages; the first two larval stages are called the free living stages, since they are observed outside the ostrich, the last two are called parasitic stages and are passed in the ostrich. Only one moulting is noticed outside the body, namely, that between first and second stage; the second one takes place immediately after the larvæ have entered into the animal. The third ecdysis takes place after 6 to 9 days' stay in the stomach, and larvæ ensue which can be recognised as imperfect males and females. The fourth or last moulting process takes place from the 18th to 24th day, when females and males appear, still immature.

They grow into mature adults, the males fertilise the females, and from about 35 days after entering the body the first eggs appear in the droppings.

Experiments were carried out with the eggs and the free living larval stages concerning

- (1) Details of their development;
- (2) Resistance to all possible influences;
- (3) Mode of life and sojourn under various conditions;
- (4) Longevity;
- (5) Infectivity.

It was found that eggs when freshly dropped are in the immature or morula stage. Soon, however, the eggs rapidly develop into an embryo, which hatches and wriggles about, as the first larval stage. Eggs in the morula or embryonic stage, when given to birds, do not develop into adults. They leave the animal again and can be found in the droppings. The larvæ in the first stage, kept under favourable conditions of moisture and temperature, undergo the first moulting process from 48 hours after leaving the host. Birds were dosed with immature larvæ, and it was found that larvæ did not develop in the host to the next stage, but were found again in the droppings. Accordingly it appears that the first ecdysis or moulting must take place outside the bird. After the first moulting process the larvæ reach the second stage, and under favourable conditions this occupies about 60 to 90 hours. To distinguish it from the first or *immature* free-larval stage, we call it the *mature* free-larval stage. At the end of it the larvæ have reached a length of 900 to 1,000 micro-millimetres, and are enveloped in a transparent chitinous skin. The mature larvæ, however, are very agile and are able to crawl about as long as there is sufficient moisture.

Birds were dosed with larvæ of the second stage during their growth and before they had enveloped themselves with the chitinous skin; these did not develop in the stomach and could be found again in the droppings. Only mature larvæ, *i.e.*, larvæ with a chitinous skin, infect ostriches and no longer appear in the droppings when the birds are drenched with them. As already stated, they require a minimum period of 35 days before eggs appear in the droppings, and the whole cycle can start afresh again.

It appears therefore from these notes that no intermediate host is required for *Strongylus Douglasii*, the development being a direct one. Once a bird is infected it appears always to be infected, and in birds kept over a period of many months no decrease in the number of eggs in the droppings could be noted. It is therefore the infected bird which maintains and spreads the infection; it acts as the reservoir of the infection.

Of practical interest are the egg and the two free-living larval stages, but particularly the mature larval stage. It will be advisable to consider them together. The following facts have been ascertained experimentally:—

- (1) Eggs kept at a temperature of 36° F. to 44° F. (temperature of the ice box) for a period of six weeks did not hatch, or when hatched did not develop as long as they were under these conditions. Not all eggs lost their fertility during this period; some larvæ hatched and developed when brought to a higher temperature after the six weeks had passed.
- (2) Eggs kept at a temperature of 44° F. to 48° F. developed slowly, but during this time a great number died and only a few hatched, and the larvæ reached maturity. They require about 8 weeks to reach this stage.
- (3) At a temperature of 45° F. to 50° F. the majority of larvæ reached maturity.
- (4) Eggs kept at a temperature of 98° F. all hatched, and the larvæ reached maturity.



- (5) At a temperature of 100° F. to 101° F. eggs hatched, but young larvæ died, whilst older larvæ, hatched previously, reared at room temperature reached maturity.
- (6) At a temperature of 102° F. to 102.5° F. older immature larvæ, hatched previously, reached maturity, but young immature larvæ did not survive.
- (7) At a temperature of 104° F. ova hatched and a few of the older immature larvæ, hatched previously, reached the mature stage. All larvæ eventually died.
- (8) Eggs, when kept in dry medium, did not develop. Eggs kept in an atmosphere saturated with moisture did not develop. (They must actually lie in a moist medium.)
- (9) Eggs kept in droppings dried at ordinary room temperature, and kept in an open glass at room temperature still hatched after a period of 17 months.
- (10) Immature larvæ of the first stage survived for the same time as eggs kept under similar conditions of dryness.
- (11) Eggs contained in droppings dessicated with calcium chloride for a period of 15 months still hatched after removal from the calcium chloride after a period of 24 months.
- (12) Immature larvæ, thus dessicated, also revived when brought back to moisture.
- (13) Eggs kept in moist droppings, at a low temperature, remained productive for 3 months. (It will probably be found that this period is even longer.)
- (14) Eggs kept in frozen manure for 10 days remained productive.
- (15) Eggs kept submerged in water at the temperature of a room only hatched in a few cases, but the larvæ did not survive. Eggs which did not hatch whilst submerged (for 2 months) did so when taken out, and the larvæ reached maturity.
- (16) The development of larvæ to maturity was influenced by temperature. At a temperature of 98° F. maturity was reached in 60 hours; at 90° F. to 91° F. in 67 hours; at 75° F. to 86° F. in 4 days; at 48° F. to 65° F. in 20 days; at 46° F. to 62° F. in 23 days; at 45° F. to 52° F. in 48 days.
- (17) Eggs exposed to the outside temperature of the winter months, varying from 28° F. to 80° F., protected from the sun and kept moist, hatched, and the larvæ reached maturity from 16 to 20 days.
- (18) Eggs kept in moist droppings, exposed to winter temperature, falling almost daily below freezing point (minimum 22° F.) and rising to and even above 100° F. (maximum 110° F.), hatched, and some of the larvæ reached maturity.
- (19) Eggs contained in the outer layer of droppings, exposed under natural conditions during the dry season, did not hatch in rapidly drying manure, but were able to hatch 4 months later, when brought under moist conditions. Eggs contained in the inner portions of the droppings hatched in the majority of cases before these portions were dried up. Only a few larvæ had reached the mature stage. The unhatched egg and the young immature larvæ did so when brought back under moist conditions.
- (20) The number of eggs passed in the droppings of ostriches, counted per gramme of droppings and calculated on the total quantity of faeces excreted per time and per day, gave an average of 2,000 eggs per gramme, or an average of 3,500,000 eggs per day in the case of two ostriches thus examined. The number of eggs calculated per excretion from 10 different birds ranged from 24,000 to 300,000.
- (21) Eggs were not found in the urine of the birds.
- (22) Mature larvæ, when kept moist and at low temperature, were still alive after 14½ months.
- (23) Mature larvæ, kept in a frozen state for 11 days, survived.
- (24) Mature larvæ, kept moist and at room temperature, were still alive after 15 months.
- (25) Mature larvæ kept dry (under dessication with calcium chloride) for 8½ months at a temperature of 93° F. to 98° F., revived when moistened.
- (26) Mature larvæ, kept under natural conditions, lived for 17 months.

- (27) When mature larvæ were placed amongst grass they crawled on to the grass and remained there for at least 7 months. More larvæ were found on the tips of grass than on the lower portions. Larvæ did not move about when dry, but did so as soon as they were moist and found themselves in moist surroundings.
- (28) Mature larvæ ceased to move about at a temperature below 38° F.
- (29) Mature larvæ, covered up by a layer of moist soil 8 inches thick, appeared on the surface after a few days.
- (30) Mature larvæ were forced to moult when placed in diluted acids (Hydrochloric acid 0.25 per cent. to 1 per cent. was most effective). Neutral salts and alkalis in any concentration did not cause the mature larvæ to cast their skin.
- (31) Mature larvæ fed to fowls passed through the intestines. The majority of them had moulted by the time they appeared in the faeces.
- (32) Mature larvæ fed to sheep passed through the intestines, the majority having moulted by the time they appeared in the faeces.

#### 8.—THE LIFE HISTORY OF THE SCAB PARASITES.

The life history of the common sheep scab parasite, *Psoroptes communis* var. *ovis*, has never been investigated in South Africa and all our knowledge concerning it was taken over from the standard European and American literature on the subject.

According to these authorities fourteen to sixteen days are required for the evolution from egg to adult or even longer—fourteen to twenty-one days.

It was thought necessary to undertake investigations to find out whether the life history of the parasite as hitherto conceived is correct as far as South African conditions are concerned. Mr. Shilston, Veterinary Research Officer, in charge of the Laboratory at Pietermaritzburg, was entrusted with these investigations in the first instance, and the results obtained were controlled in the second lot of experiments at Onderstepoort under the care of Mr. Bedford, the Entomologist of this Division.

- (a) The life cycle of *Psoroptes communis* can be divided into the following stages: (1) Egg, (2) larva, (3) nymph, (4) imago or adult. In the case of the female adult a pubescent and an ovigerous stage are distinguished.
- (b) The maximum number of eggs a female was observed to lay amounted to ninety-three, and the maximum number observed to be laid by three females in one day was thirty. The maximum length of time a female lived on a sheep was forty days.
- (c) In the experiment at Pietermaritzburg the eggs hatched forty-eight hours after being laid when in direct contact with the skin of a sheep, and when placed on top of a thick crust they remained three or four days before hatching; when tied in long wool an inch and a half from the skin they all hatched in from six to eight days. When kept away from the sheep for eight days at room temperature they still hatched two days after being brought back to the sheep. Eggs kept ten days under such conditions failed to hatch. Eggs stored in moist sheep faeces for thirteen days failed to hatch on sheep. In summer eggs kept away from the sheep when protected against the sun hatched in three to four days. When exposed to direct sunlight they shrivelled up.

In the experiments at Onderstepoort the eggs in contact with the skin had hatched from the second to the third day, the majority on the second day, and when tied in the wool at a distance of half an inch, in three to four days.

- (d) The larvæ moulted into nymphæ in two days, viz., fourth and fifth day after the eggs were laid; when removed from the sheep the larvæ lived two to three days only.

At Onderstepoort the moulting from larvæ into nymphæ was noted to occur on the second and third day after hatching.

- (e) The engorged nymphæ moulted into pubescent females on the fifth day after hatching; male adults have only been observed on the sixth day in the experiments at Pietermaritzburg. At Onderstepoort adults were noted on the sixth and seventh day after hatching.

- (f) The copulation of the two sexes was noted in Pietermaritzburg as early as the sixth day after hatching and lasted one to two days. At Onderstepoort this occurred on the seventh and eighth days after hatching.
- (g) The pubescent females underwent another moult either during copulation or very soon afterwards, and commenced to lay eggs two days later, *viz.*, ninth and tenth days after hatching. In one case in Pietermaritzburg eggs were laid eight and a half days from the time of hatching. The first eggs were seen at Onderstepoort on the ninth day after hatching; the length of time elapsing between hatching of the eggs and the laying of the eggs by the hatched acari is therefore eight and a half to ten days.

Acari removed for sixteen days from the sheep, in crusts kept at room temperature, when placed again on sheep were no longer infective, although a few of them showed life for some days when warmed.

#### *Conclusions.*

Since most of the dipping fluids employed in the treatment of scab failed to destroy the vitality of eggs, it is necessary to regulate the interval between two successive periods, so that the second immersion is given before acari hatched from eggs that survived the first dipping begin to lay eggs themselves. It is evident from the facts given above that the second dipping should be given the eighth day after the first if we base the deductions on the Pietermaritzburg observations, and not later than the ninth day according to Onderstepoort results. The former probably indicates the shortest possible period, and a dipping on the eighth day will reach those female acari which would lay their eggs as late as the tenth day. The eggs all hatch within eight days, whether in direct contact with the skin or detached from it in the wool. Considering that the dipping fluid remains active in the skin for one or two days, the period might be extended to nine or ten days, but certainly not later.

During the period under discussion also a number of experiments were carried on with the various dips in common use by farmers using them at nine days' interval. These have, however, not advanced so far as to allow definite recommendations.

### MISCELLANEOUS INVESTIGATIONS.

#### 9.—DISEASE IN CATTLE (ELANDSLAAGTE, NATAL).

In March, 1913, a report was received from the Senior Veterinary Surgeon, Pietermaritzburg, to the effect that heavy mortality had occurred amongst some cattle in the neighbourhood of Elandslaagte, and as the question appeared to be of a serious nature an investigation was commenced by Mr. Shilston. The chief lesions were those of a gastro enteritis, but neither arsenic nor plant poisoning could be held responsible. A number of cattle were purchased and exposed on the farm for inoculation and transmission experiments, but all attempts proved abortive. Three control animals sent to the farm from the Pietermaritzburg Laboratory contracted the disease, but apart from the conclusion that the agent responsible for the sickness existed on the veld no further information could be obtained, and as the disease ceased in August arrangements were made for the investigations to be discontinued.

#### 10.—EFFECT OF DIPPING WORKING OXEN.

As a result of enquiries instituted amongst the farmers in Natal, it was considered advisable to undertake some experiments to note whether a reduced strength of arsenical dip could be used which would be effective from a tick-destroying point of view, but would not cause so much distress to working oxen as was noted to occur amongst those dipped in the ordinary strengths.

Owing to considerable delays the erection of the "walk in" tank was not finally completed until November, 1913, when the experiment was commenced with 10 oxen, but no definite conclusions had been arrived at by the end of the year. At the same time it was desired to test the value of the so-called "walk in" tank, as many farmers in Natal had reported that cattle were more effectively dipped if they could slowly walk into the tank and swim across, than when they plunged in from a steep slope, the reason being that owing to the



well of the tank being so short many cattle were able to jump practically from the "in take" to the "out slope," thus escaping proper immersion.

The "walk in" tank is apparently as effective as the ordinary plunge tank when the precaution is taken to have the heads submerged as the animals swim through the liquid, a precaution which is perhaps no longer necessary once the farm is freed of East Coast Fever.

#### 11. DUN SICKNESS IN HORSES.

For some time past we have been carrying out investigations into Dun Sickness in horses, although it is to be regretted that pressure of other work has not enabled us to give the disease the amount of attention it deserves.

The preliminary investigations into the possibility of the disease being due to a plant were carried out under the supervision of Mr. Webb, the Government Veterinary Surgeon at Mooi River, in 1912, and according to his final report it would appear that the disease known as Dun Sickness in Natal is not due to the ingestion of one of the suspected plants, *Senecio Latifolius*, even though this particular plant is capable of causing death if a horse is forced to partake of it in sufficiently large quantities. Although these experiments seemed to conclusively disprove the idea held by some veterinary surgeons and farmers that *Senecio Latifolius* (or as it was termed locally "Dan's Cabbage") was the actual cause of Dun Sickness, it was considered advisable to undertake further tests to ascertain whether plants obtained from other localities had any toxic effect or not. Another factor taken into consideration was Mr. W. Robertson's experiments of 1906, at Molleno, Cape Province, when it was shown that horses fed on certain varieties of *Senecio* developed a fatal disease known as Stomach Staggers, in which the main lesion corresponded to that found in Dun Sickness, namely, a cirrhosis of the liver. With this information at our disposal, arrangements were made, through the courtesy of Mr. Gray, for a weekly supply of *Senecio Latifolius* from the Kokstad area, and two horses were fed almost constantly for 124 days, each with 1 lb. of the plant. As no results had been noticed by this time, and the horses were required for experiments in connection with Horse Sickness, the Stomach Staggers test was discontinued, and the two horses were injected against Horse Sickness.

The peculiar observation was then made that one of the horses died under the influence of the Horse Sickness re-action, not from Horse Sickness itself, but from a dissolution of blood known as Hæmolysis, and as no other horses in the same experiment developed similar symptoms I am inclined to connect this fact with the previous feeding of *Senecio*. To our great surprise, the second horse developed all the symptoms of Stomach Staggers, *i.e.*, hanging head, boring into the corner of the stable, "drunken" gait, and finally loss of condition. These symptoms persisted for about 14 days, after which time the horse gradually recovered.

It would therefore appear that the ingestion of Ragwort, which does not of necessity produce a disease, may yet give rise to symptoms when the animal is under the influence of another disease. This observation has only been noted in one instance, and naturally I am not prepared to make any definite pronouncement until further experiments have been made.

#### *Heartwater Tests.*

We occasionally receive reports from farmers living in the bush veld of sickness amongst cattle, usually termed Gallsickness, but on examination of the blood of such animals the presence of Anaplasms is seldom detected. In such cases we notify the owners that in all probability he has to deal with Heartwater, and ask him if the Bont Ticks are found on his farm. If this proves to be the case samples of blood are sent in from the next animal to become sick, and is injected into sheep or goats at Onderstepoort but the micro-organism of this disease does not retain its virulency for more than 48 hours and this accounts for the large percentage of negative results. In all 31 samples of blood were received and can be summarised as follows:—

Tests which proved the presence of Heartwater	...	...	6
Tests which failed to reproduce the disease and in which no delay had occurred in the transmission of the blood, thereby definitely excluding Heartwater	...	...	15
Tests which gave negative results, but cannot be considered as definitely excluding Heartwater, owing to delay in the transmission of the blood	...	...	10

## MISCELLANEOUS PLANT-FEEDING EXPERIMENTS.

We frequently undertake plant-feeding experiments either at the direct request of farmers or through representations made by the Botanical Division, and during the period under review some 13 tests have been carried out, amongst which the following deserve recording:—

*Loquat (Eriobotrya japonica).*

One ox was fed daily with 2 lbs. of the leaves of the plant for a period of 10 days, whilst a second animal received 1 lb. of the seeds (no fruit) for a similar period.

No symptoms of illness appeared.

*Slangkop (Urginea macrocenta).*

Three head of cattle were used for this experiment, the first one eating 1 lb. 5½ ounces, and with the exception of slight looseness of the bowels no symptoms developed; the second one consumed 2½ lbs., and a day or two afterwards purging was noted, the animal gradually became weaker, and finally died a month later; the third animal showed signs of purging after having eaten 2½ lbs. of Slangkop, and died within six weeks of acute Gastro Enteritis.

Supplies of the four following plants were kindly forwarded by Dr. Ricono, the District Surgeon of Mount Fletcher, Cape Province, with interesting information concerning the uses to which they were put by native doctors.

*Lasiosiphon (supposed to cause vomiting and purging in man).*

A goat and a sheep were drenched daily for 14 days with 8 ounces of a tea made from the bulbs of the plant, but without any results.

*Phytolacea heptandra* (the root is reported to be the most poisonous plant in the Mount Fletcher area, producing vomiting, fainting and collapse).

A goat and a sheep drenched for 14 days with 8 ounces of a tea failed to exhibit any symptoms of illness.

*Senecio adnatus.*

A sheep and a goat drenched as above suffered no ill effects.

*Borriea volubilis (a poison producing purging).*

A goat and a sheep were drenched for 2 days with 4 ozs. of a tea, and within 2 days both animals had died of Gastro Enteritis.

*Maize Stalk Disease (Fungus growth—Diplodia zeae).*

In the early part of the year information was received from Natal to the effect that mortality occurred amongst cattle fed on maize cobs obtained from certain lands, and on investigation by Mr. Pole Evans it was found that these particular maize cobs were infected with a fungus known as *Diplodia zeae*. Experiments were accordingly undertaken at Onderstepoort, both with samples of the maize and with cultures prepared from the fungus growth.

The maize cobs were fed to a mule, a heifer, two sheep and two goats, for a period of 2 months, but no disease developed. The cultures were used for feeding a heifer over a period of 12 days, during which time 23 lbs. was eaten, but again no symptoms appeared.

*Pleuro Pneumonia in Cattle (Lungsickness).*

An outbreak of Pleuro Pneumonia occurred amongst our experimental cattle running on the farms Wolthuiskraal and Buffelsdrift, and the cause of the outbreak can only be traced to an inoculation of cattle undertaken at the Laboratory, which had been used for the preparation of virus.

None of the animals showed a re-action due to the inoculation, and accordingly they were later discharged from the experiment and removed to the bush veld farm. This outbreak clearly shows that cattle can become infected with Pleuro Pneumonia from inoculation, although not showing symptoms due to the inoculation, and are capable of spreading the disease. The pros and cons of such a possibility have repeatedly been under discussion, and I consider the experience of great value in settling the point once and for all.

## A HISTORICAL SKETCH OF THE INVESTIGATIONS INTO LAMZIEKTE.

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## A HISTORICAL SKETCH OF THE INVESTIGATIONS INTO LAMZIEKTE.

## EXPERIMENTS IN THE CAPE COLONY.

## THE PHOSPHATE DEFICIENCY THEORY.

The late Dr. Hutcheon was the first veterinary expert who attempted to clear up the nature of Gal Lamziekte, or as it was called in his days, Lamziekte.

From clinical observations, from autopsies, and after sifting all the evidence collected from farmers in various parts of South Africa where Lamziekte was rampant, he came to the conclusion that it was a "deficiency disease," phosphates in particular being the substance lacking. He was able to explain by this theory the enzootology and epizootology of it; the various forms of Stijfziekte were thought by him to be all due to the same cause, indeed these were identified with rickets or osteomalacia or at least brought into a parallel with them. This view had in its support the fact that the soil on which the disease was prevalent was deficient in phosphates, and the one striking symptom, an abnormal craving, in particular for bones, seemed to point directly to the want of some substance required by the cattle. As a preventive, Hutcheon recommended a liberal use of bone meal: this has been used to a large extent throughout South Africa, and its beneficial effect or otherwise formed the subject of discussion at many farmers' meetings. Since its introduction into practice opinions were always divided. According to the experience of some farmers, bone meal stopped the disease, whilst in the opinion of others it had no effect whatever. This controversy led to the first experiments undertaken with the object of proving or disproving whether the supply of bone meal is a preventive for Lamziekte.

*Witte Clay Rug Experiments.*

The experiment was carried out under the supervision of Mr. Borthwick, in 1895, on a farm Witte Clay Rug, in the Eastern Province, which was renowned for Lamziekte. The farmers who were interested nominated a committee to assist, and a number of cattle were supplied for the purpose. There were thirty-seven head received and valued; these were divided into two lots of twenty-three and fourteen respectively. The twenty-three were placed in a kraal and received an allowance of bone meal daily, while the fourteen were kept in another kraal and received nothing. Both lots grazed together by day, and were in every respect treated alike. The reason why the cattle were not more evenly divided was because this farm had such a bad reputation for Lamziekte that they were led to anticipate that a great many of the lot not receiving bone meal would take the disease, and as it was not intended to make the experiment more costly than absolutely necessary only a small portion was risked. Within a month no mortality took place, and then some more and younger cattle were added to the lot, viz., thirteen heifers, one young cow, and three young oxen. Of these, seven had to receive bone meal and nine not.

The experiment was concluded in February, 1896, and the results were as follows:—*None of the animals which received bone meal manifested the slightest indication either of Stijfziekte or Lamziekte, while out of twenty-three which did not get any, ten became affected, four of which terminated fatally, and two of which were killed for experimental purposes.*

From these experiments the deduction was warranted that a regular supply of three ounces of bone meal given daily had a beneficial effect on the prevalence of the disease. Hence the *phosphate deficiency theory* had an *experimental support*.

*Koopmansfontein Experiments.*

Notwithstanding the results at Witte Clay Rug the question of the application of bone meal under the conditions of the practice did not disappear from the controversies at the farmers' meetings, particularly in Bechuanaland.

In 1907, therefore, new experiments were undertaken by the Cape Veterinary Department, in Koopmansfontein, under the care of Spreull, to note what the effect of bone meal and other materials would be on the Lamziekte of that area.

The dosing was started on 27th November, 1907, and the different lots were as follows:—

I. (1) *Control Lot.*

Control lot of 17 head, to receive a salt lick only.

(2) *Tar Alone Lot.*

Ten head of cattle to receive the salt lick and three (3) table-spoonsful of tar twice a week. This experiment was only started on 29th February.

II. *Bone Meal Lot.*

Cattle to be allowed free access to bone meal during the whole time of the experiment.

This lot was divided as follows:—

(3) *Find Themselves Lot.*

Twenty cattle not to receive any addition to the bone meal.

(4) *The Extra Bone Meal Lot.*

Twenty cattle to receive, three times a week, three table-spoonsful of bone meal.

(5) *Tar and Bone Meal Lot.*

Twenty cattle to receive, three times a week, two table-spoonsful of Stockholm tar.

(6) Twenty cattle to receive, three times a week, two table-spoonsful of loog ash.

The cattle in 3 and 4 also received from 14th January the extra three table-spoonsful of bone meal.

The results were as follows:—

- (1) No sickness in extra bone meal lot.
- (2) One animal died in tar and bone meal lot after receiving one dose of tar, and before the extra bone meal had been given. One died of another cause.
- (3) In the loog ash and bone meal lot two cows died of Lamziekte and one from other causes.
- (4) In the tar alone lot one cow died of Lamziekte and two died of other causes. Two others sickened and recovered. This lot did very badly.
- (5) The "find themselves" lot had two deaths in December, 1906, and it was thought that the bone meal could not have had time to act as a preventive.
- (6) Of the control lot, 9 contracted Lamziekte and 5 died, representing a mortality of 30 per cent.

The mortality in the bone fed lot from Lamziekte was put down at 1.33 per cent.

The conclusion, therefore, from these results were again that bone meal, if not a perfect, is at least a very remarkable preventive against Lamziekte.

*Yarrow Experiments.*

The farmers in the bush veld of the Eastern Province, particularly in the area between Grahamstown and the sea, and the valley of Kareiga, held, notwithstanding the results at Witte Clay Rug and Koopmansfontein, that their form of Lamziekte was not prevented by bone meal.

In order to settle this controversy and at the request of several Farmers' Associations, an experiment was undertaken by Mr. W. Robertson, then Director of the Bacteriological Laboratory, Grahamstown, on the farm Yarrow, in the Lower Albany District, near Seven Fountains, sixteen miles from Grahamstown. This farm was reputedly bad for cattle owing to Lamziekte, as many as fifty head of cattle having died in a single year. The experiments were started at the end of July, 1909. Seventy cattle were taken of all ages and types. Forty-two were left as controls; thirty received daily 2 ozs. of bone meal (Alexander Bros.). In addition to the forty-two controls, a lot of twenty, belonging to the owner of the farm, and thirty-one to natives were under observation.

These experiments were still in progress at the time the Union Department of Agriculture was organised, and they were continued until April, 1912, the results being as follows:—

Four head of cattle had died of the controls, three of the owners lot and two of the natives lot, whereas in the bone meal lot only one suspicious case had occurred.

Mr. Robertson, at the time of handing over in September, 1912, to Mr. Walker, before proceeding on leave, had drawn from the results of these experiments, *the conclusion, that bone meal had undoubtedly a preventive effect on the disease, and he concluded further, that deaths reported as Lamziekte, were not always due to this disease but to digestive troubles, poisoning, etc.*

Shortly after Mr. Walker took over he reported the presence of Bont Ticks on the farm Yarrow, and naturally suspicions arose that the mortality on the farm might not in all cases be due to Lamziekte, although reported as such. This was clearly brought out by the first observation made, where a heifer, reported to be suffering from Lamziekte, proved by inoculation of its blood into sheep, to be Heartwater. Accordingly, from that date onwards, the diagnosis was controlled by inoculation into sheep. Mr. Robertson's opinion thus found some support on Yarrow itself.

The Yarrow experiments might be also interpreted as supporting the phosphates deficiency theory, but in view of the presence of Heartwater on the farm they cannot claim the same reliability.

#### THE INFECTION THEORIES.

In the *Cape Agricultural Journals* of September, 1904, and April, 1906, Mr. Thos. Bowhill, then Officer in Charge of the Government Laboratory, Grahamstown, published an article entitled "Stock Diseases of the Eastern Coastal Districts," in which he pointed out the existence of *Pasteurella bovis* in these regions. In the report of 1904 he distinguished three forms:—

- (1) Associated with swelling of the throat and tongue, in many instances resembling Anthrax.
- (2) Exhibiting extensive thoracic lesions; chest full of exudate; also the pericardial sac; spleen slightly enlarged.
- (3) A chronic form of No. 2.

In a special report of the same date he referred to an investigation into an outbreak of Lamziekte on the farm Hillary, and he stated that he found microscopically in the lymph glands the ovoid belted organisms peculiar to the *Pasteurella* group, and of which he obtained a growth. The culture was injected into guinea pigs, which died of septicaemia.

In the report of 1906, he drew attention to the *erroneous diagnosis of Lamziekte—a bone disease, stated to be due to the want of phosphates.*

He stated that "it is a noteworthy fact that bones taken from typical cases were found on analysis to be normal in the chemical constituents especially described as wanting in Lamziekte. The congested state of the bones of these cases were connected with the re-action of bone-marrow to septic infection. The true nature of the disease, Lamziekte, has not been recognised, owing to the misunderstanding of these lesions. Attention has also been drawn to another form of disease frequent during the year, commonly described as "blood lung." He was able to produce this form by inoculation of *Pasteurella* cultures obtained from sheep. He furthermore described a *Pasteruella* of the goat, horse, ostrich and the swine; it is noteworthy that both the horse and the ostrich had been said to be suffering from Lamziekte. Mr. Bowhill's report, however, does not contain any definite statements, the idea of *Pasteurella bovis* is thrown out more in a general way, and should cover a number of ailments not classified in those days. The ideas were practically those of Ligniere, formed on his observations in the Argentine, and adapted to South African conditions. In the course of time Ligniere's conceptions failed to be corroborated, and many were even contradicted. In South Africa they were never adapted in the wide sense as introduced by Bowhill. The idea of a *Pasteurellosis*, both in cattle and in ostriches, however, found some support in South Africa.

In the *Cape Agricultural Journal* of September, 1907, Mr. W. Robertson, then Director of the Veterinary Laboratory, Grahamstown, published under the name of Pneumo-Enteritis or *Pasteurella bovis*, a paper on a stock disease of the Eastern Coastal Districts, sometimes confounded with Lamziekte or Osteo-



malacia. He referred to the term Lamziekte, used for a disease with a progressive paralysis, due to defective nutrition, and hence softening of the bones, and stated distinctly that in the Eastern Province a totally different disease, with a totally different train of symptoms and *post-mortem* appearances, was indicated. This disease, according to his findings, was a Pneumo-Enteritis, of which he distinguished an acute and a chronic form, found in cattle of all ages. From the clinical and pathological descriptions there appears to be no doubt that this disease is not identical with Hutcheon's original Lamziekte, or with the Gal Lamziekte of to-day.

Mr. Robertson found a polymorphic bacillus, a motile facultative anaerobe, which was easily isolated from the mesenteric glands. Inoculations into cattle and sheep produced the disease. He thought that it was identical with that described by Nocard and Leclainch as "*Pasteurellose du boeuf et du mouton*," by Ligniere in the Argentine as "*Enteque in calves and Lombriz in sheep*," and by Bowhill as "*Pasteurella*." In September, 1910, in the *Journal of Comparative Pathology and Therapeutics*, Mr. Robertson published an article under the name of Lamziekte, in which he apparently described, at least in parts, that disease which we have under consideration, inasmuch as reference is made to the experiments at Witte Clay Rug, under Mr. Borthwick. He says that up to this period Lamziekte was believed to be purely a dietetic disease; that Bowhill had demonstrated the bacterial nature of it and produced cases from cultures. The descriptions given of the two varieties of the disease, as well as the conditions under which it is said to occur, do not exactly tally with the Lamziekte we have under consideration. They refer in parts to the disease described by him in 1907 as Pneumo-Enteritis, and in parts to the Lamziekte of Hutcheon.

The so-called *Pasteurella* bacteria is described and experimental cases are recorded as being produced by this bacterium. The descriptions of these experimentally-produced cases do not, however, correspond with the Lamziekte of Hutcheon; they correspond to disease described in 1906.

Robertson utilised this bacillus as a vaccine, growing it at 37° C., in bouillon for 21 days, subjecting it to a temperature of 60° C. for sixty minutes, and adding 0.5 per cent. carbolic acid. Two doses, in an interval of about 20 days, were used, of 10 c.c. and 20 c.c. respectively. This inoculation had been introduced into practice as an experiment: some 500 head of cattle were inoculated, which were awaiting the test of a natural attack of the disease; some had been running for months on badly affected farms, where controls have succumbed, and the results obtained were encouraging.

#### EXPERIMENTS, ORANGE FREE STATE.

In the 6th Annual Report of the Agricultural Department, O.F.S. (1909-1910), Mr. Keeling Roberts, M.R.C.V.S., gives the results of his investigations carried out on the farm Besters Put. Experiments to transmit the disease from sick to healthy animals were undertaken, and the results may be summarised as follows:—

The subcutaneous or introjugular injection of blood or the drenching of animals with blood did not produce any disease, whilst the administration of viscera to 4 cows, 2 calves and 3 goats, produced a disease, *which on post-mortem was identified as Lamziekte*. Roberts also had isolated a bacillus, which he was inclined to identify with that of Bowhill, and found that these cultures killed when injected into goats, but *post-mortem* examination revealed nothing symptomatic of Lamziekte. When injected into an ox, cow and goat, death followed, and lesions of Lamziekte were found on *post-mortem*. Notwithstanding these apparently positive results, Mr. Roberts was not prepared to make a definite statement with regard to this bacillus; he was *never able to produce* the disease by giving the culture *per os*, a surprising fact, *considering that viscera are capable as he thought of producing the disease if so applied*.

#### EXPERIMENTS UNDERTAKEN BY THE GOVERNMENT VETERINARY BACTERIOLOGIST, TRANSVAAL.

##### EXPERIMENTS AT DEELPAN, DISTRICT LICHTENBURG.

In the year 1908 I was approached by the farmers of the Western Transvaal to undertake investigations into Gal Lamziekte, outbreaks having been reported in the Districts of Lichtenburg and Bloemhof, the mortality being particularly heavy in the wards of Christiana and Schweizer Reneke. A preliminary visit

was made by Mr. Gray, the Principal Veterinary Officer of the Transvaal, and myself, in the early part of 1908, in order to obtain more information regarding the ravages caused by the disease, and from actual observation to endeavour to obtain an idea of the symptomatology and pathology. In this latter we failed, as we were not able to find a sick or dead animal. From our interviews with a number of farmers we were convinced, however, of the necessity for an early investigation. On continuing our visit into the Marico District we were able to see some cases of Stijfziekte, and since Lamziekte and Stijfziekte had always been spoken of as diseases of identical causes, we decided to extend the investigations into Stijfziekte at Zeerust, thinking that the solution of one problem might throw light on the other. Before commencing the experiments an enquiry, in the form of a query sheet, was distributed amongst farmers in the South-West Transvaal, and as a result of their recommendations as to a suitable site for the experimental camp we decided on Deelpan, in the Lichtenburg District. Mr. Gray was good enough to allow Mr. W. G. Evans, then Government Veterinary Surgeon at Zeerust, to assist us in every possible way, and it was largely due to his help that we were able to arrange all the details. The experiments were commenced in December, 1908, and were placed in the hands of Dr. Frei, Assistant Veterinary Bacteriologist. The object was in the first instance:—

- (1) To study the clinical and pathological aspect of the disease;
- (2) To find out in which way the disease was contracted;
- (3) To ascertain whether it was communicable from sick to healthy animals by inoculation; and
- (4) To undertake a thorough pathological and bacteriological study of all organs.

With the assistants of the neighbouring farmers 122 head of cattle were obtained, for which a small hiring fee was paid, and in case of death compensation was to be paid out according to a valuation mutually decided on. The experiments were arranged as follows:—

- (1) Animals to run over the infected area, under the same conditions as cattle are kept in the Western Transvaal (Controls).
- (2) Animals to be muzzled to prevent them eating grass, and to run together with the controls.
- (3) Animals to be kraaled alone. (The muzzled and kraaled lot had to be fed with forage.)
- (4) Animals to be fed with grass taken from the infected area.
- (5) Animals to be utilised for drenching and inoculation experiments.

#### *Result.*

Twenty animals were utilised as controls; of this lot none died.

Into the muzzled lot 10 animals were placed, of which 4 died. From *post-mortem* reports it appeared that death was due to malnutrition in three instances, and to tympanitis in one case.

Of the 10 animals kraaled and fed on dry forage 2 died, the cause being put down to malnutrition.

Of the 10 animals fed on grass from Lamziekte area 1 died, the cause of death also being malnutrition.

Experiments to convey the disease from sick to healthy animals were undertaken on 16 different animals, and were so planned that a number of animals were injected with large quantities of emulsion of organs and drenched at the same time with the contents of the stomach and the intestines. The following organs and liquids were used: Kidney, spleen, liver, mesenteric glands, pericardial liquid, bile, spinal cord, brain, subdural liquid, blood, tonsillæ; and for drenching the contents of omasum, rumen, abomasum, jejunum and colon.

In one instance bone meal, made from the bones of a cow which died of Lamziekte 12 months previously, was given. In the case of one animal from which material had been utilised taken 15 hours after death, acute septicæmia was noted after the injection. In all other cases the results were negative.

*Accordingly it proved not to be possible to transmit the disease with the material utilised.*

#### EXPERIMENTS AT ONDERSTEEPOORT.

From various sources the information had been obtained that cattle hitherto running on a Lamziekte farm contracted the disease some time after their transfer on to a clean farm. This observation would indicate an incubation period, and

if such was the case, an infectious disease would have to be suspected. The question of the possibility of studying the disease in the Laboratory at Onderstepoort thus arose. It was thought advisable to test the point, and for this purpose arrangements were made with a farmer in the Christiana District, on whose farm the disease had been and was still rampant, to bring a number of cattle to Onderstepoort to keep them under observation, and in case of an outbreak of undertake transmission experiments.

In May, 1909, 26 head of cattle arrived at Onderstepoort and remained here until August, 1909, but no disease was noticed during this period. *The results being negative, they were open to different interpretations and no conclusions could be drawn.*

#### INVESTIGATIONS INTO STIFFSICKNESS.

##### *Experiments in Zeerust and Barberton.*

These were commenced in 1910. Some time previously Mr. Johnston, then Government Veterinary Surgeon in Barberton, had brought to our notice the existence of a disease called Stiffsickness, in cattle in that District, and which he described as Laminitis of cattle. No special notice was taken at the time because the disease was not connected with any specific cause. At later period, previous to our visit to Zeerust, the late Mr. Turnbull, then Government Veterinary Surgeon in Barberton, connected the disease with the plant *Crotolaria burkeana*, commonly called "Stijfziekte Boschje." In Zeerust also this plant was accused as being the cause of Stijfziekte in those parts of the country. It was accordingly decided to carry out experiments in both places. This was done by sending cattle from Pretoria to each of the two places, where they were stabled and fed on the freshly cut plant. Altogether six head of cattle were utilised, and in all of them the disease could be produced by feeding *Crotolaria burkeana*. It appeared as early as four days after the herbs were given. There was accordingly no longer any doubt, that the *Stijfziekte Boschje* is a cause of a *Laminitis* in cattle.

#### EXPERIMENTS UNDERTAKEN BY THE DIRECTOR OF VETERINARY RESEARCH (UNION).

##### SCHOONHEID, CHRISTIANA.

In May, 1909, the farm Deelpan proved to be unsuitable for our purposes, as it was too far away from a railway station; it was decided to look for a more suitable place somewhere near the railway.

After enquiries had been made it appeared that the farm Schoonheid, near Christiana, would be suitable for our purpose. The cattle were obtained from the owner of the farm, against an agreement whereby he was paid for the loan and for any deaths that occurred. A lot of 32 head of cattle from a non-infected area (Onderstepoort Laboratory) were also utilised. The objects of the experiments were identical as laid down for the Deelpan experiments. A total number of 99 head of cattle were utilised. The experiments were under the care of Mr. Walker, M.R.C.V.S., and were commenced early in 1910. The cattle were split into four lots:—

- (1) To be constantly kraaled and fed on forage from a non-lamziekte area.
- (2) To be grazed over the lamziekte area (controls).
- (3) To be muzzled and to run with the controls, and to be fed with forage from a non-lamziekte area.
- (4) To be utilised for inoculation experiments.

The experiments lasted from 18th February, 1910, until 19th September, 1910. During this period only *one* case of Lamziekte was noted in the experimental cattle, a cow in the grazing lot. Advantage was, however, taken of the disease on neighbouring farms, and material obtained was utilised for transmission experiments, both by drenching and inoculation.

##### *Transmission Experiments.*

During the eight months a total number of 136 experiments were made in the endeavour to transmit the disease in the way indicated, and the following materials were used: Blood, faeces, sub-arachnoidal fluid, bone marrow, bone meal, brain, spinal cord, contents of rumen, mucus and gelatinous exudate of



faeces contents of abomasum, contents of small intestines, muscle, uterine membranes, uterine fluid, urine, spleen, scrapings of mucosa of mouth and pharynx and mesenteric glands.

In two cases death was caused with portions of small intestines and abomasum of cattle in which putrefactive changes were advanced causing the symptoms of paralysis of the muscle of deglutition and of the tongue, and in one case the intralymphal injection of spleen pulp had a similar result. In this instance also the material was partly decomposed. These deaths could not be identified with Lamziekte. Accordingly the results thus obtained did *not* allow the conclusion that the disease *could be transmitted* by inoculation with the material utilised.

#### *Bacteriological Investigations.*

Bacteriological investigations were carried out on a fairly extensive scale, and cultures were obtained from mesenteric glands, contents of intestines, mucosa of intestines, brain and cord, and were injected into healthy animals without producing any ill-effects. Sub-cultures from intestinal mucosa of a Lamziekte animal, in which putrefactive changes had been noted and which material had produced the two cases of deaths already alluded to, also produced toxæmia when injected in cattle and goats. It was found that cultures were *not always* obtained from material collected from Lamziekte animals.

Mr. Walker came to the conclusion that cultivatable bacteria isolated by him could therefore be excluded as a cause of Lamziekte.

On 19th September, 1910, Mr. Walker was relieved by Mr. Mitchell, the former officer going on leave and spending his time in Paris, partially at the Institute Pasteur and partially at the Veterinary College in Alfort. He took material of Lam sickness with him, in particular the spinal cords and some peripheral nerves, for the purpose of working out the minute pathological histology. The histological appearances were found to be normal in all cases, and a careful search in the cytoplasm of the ganglion cells of the cord or their branches for inclusions all gave negative results.

After his return from Europe, Mr. Walker was placed in charge of the Grahamstown Laboratory, and instructions were issued to him to continue his investigations into Lamziekte, in the first instance with the object of finding out what relation the so-called *Pasteurella bacillus* had with Lamziekte. He was asked to make a study of the characters of the organism and to apply the serum test to its identifications.

- (1) By the fixation of complement, using an emulsion of the *Pasteurella* organism as antigen; and
- (2) By the agglutination test.

At the same time the method of complement fixation was to be tried for diagnostic purposes of Lamziekte, using as antigen an extract of organs of a Lamziekte animal. The results showed that:

- (1) The serum of an animal injected with *Pasteurella* culture fixed the complement, when the injection had been made within the last 15 months previously;
- (2) The serum of six recent cases of Lamziekte caused no fixation, using as antigen an extract of the *Pasteurella* organisms; in one instance where the animal had recovered 12 months previously a slight deviation was noticed. If the *Pasteurella bacillus* had anything to do with Lamziekte the serum of Lamziekte cases should fix the complements in the same way as the serum of animals injected with the culture.

The agglutination tests gave similar results. The serum of healthy animals did not agglutinate, the serum of cattle recently injected with *Pasteurella* agglutinated, that of cattle inoculated some time back failed to agglutinate, and the serum of animals of Lamziekte also failed.

The study of the bacillus showed that it belonged to the Coli group

These results justified the conclusion, that the *Pasteurella* had *no connection* with Lamziekte.

The complement fixing test with Lamziekte organs as antigen (liver and spleen) was not successful. No conclusions can be drawn from this.

## EXPERIMENTS IN SMITH KRAAL, O.F.S.

*Experiments to determine in which way the disease is contracted.*

The experiments at Schoonheid not having given the information we were requiring owing to the scarcity of cases, it was decided to abandon the place and to continue on a new place and under better conditions. The farm Smith's Kraal, O.F.S., on the Vaal River, was selected as being very unhealthy.

The cattle were taken over from the proprietor under similar conditions as entered into before. The farm had the one great disadvantage of being 14 miles away from the nearest railway station, Warrenton.

The experiments were commenced on 21st January, 1911, and continued until 21st September, 1911. The cattle were allowed to graze in the veld until the 1st October, 1911, when a new grazing and muzzled lot were selected. The experiments were then continued without interruption until 5th January, 1912. The main object was to find out whether the disease was contracted by ingestion. One hundred animals were utilised: 50 were allowed to graze day and night in the veld (grazing lot); 50 animals were muzzled by day and were herded with the grazing lot. At night these animals were placed in a kraal, from which all vegetation had been removed, and fed with material grown on an area where the disease was unknown. Both lots obtained the same water.

*Result.**(1) Muzzled Lot.*

Two animals of the lot selected on the 18th October, 1911, developed Lamziekte on the 12th and 13th day, after they ceased to graze on the Lamziekte area. Before and after this no further cases occurred, and the conclusion is justified that these two animals contracted the disease whilst grazing on the veld before being placed in the muzzled lot.

*(2) Grazing Lot.*

Into this lot must be included the cases just mentioned. Together with these, 14 cases or 28 per cent. of the cattle that had been grazing contracted the disease. Of this lot only 4 recovered.

*The conclusions from these observations were, that the disease is contracted by the animals grazing on the veld and that it is not contagious.*

*Transmission Experiments.*

- (1) The following material was injected subcutaneously: Blood, bile, mesenteric glands, spleen and bone marrow, liver, mucosa and submucosa of jejunum, ileum and lung. In all the cases the results were negative.
- (2) The following material was injected into the lymphatic glands: Peritoneal fluid, urine, subarachnoidal fluid, brain, bile, bronchial, mediastinal and mesenteric glands, spleen, liver, kidney, mucosa and submucosa of jejunum and lung. In all cases the results were negative.
- (3) The following material was drenched: Contents of abomasum, ileum, jejunum and faeces. No results were obtained.
- (4) The contents of the rumen of a Lamziekte animal dried in shade or sun were fed on a number of animals without result.
- (5) Feeding cattle with bones from cattle that died of Lamziekte was also carried out. In one case death resulted from what appeared to be toxæmia, due to absorption of septic material from the bones, but in no case could Lamziekte be produced.

*Result.*

All attempts to convey the disease by drenching or injecting healthy cattle with substances of sick cattle failed.

*The conclusion was drawn that the disease was neither contagious nor infectious in the same way as the well-known infectious or contagious diseases are,*

## THE TOXIC PLANT THEORY.

*Experiments with plants, suspected to be the cause of Lamziekte.*

*Experiments carried out in Schoonheid, Smitskraal, Armoedsvlakte, Grahamstown and Pretoria.*

When the experiments were commenced again in Schoonheid in 1910 it was thought advisable to give attention to specific plant poisons as a possible cause of the disease. This was thought necessary because a good many farmers held this opinion, and indeed Lamziekte could be explained by the ingestion of a poisonous plant. Accordingly, Mr. Burtt-Davy, then Government Botanist, was approached for assistance.

Mr. Burtt-Davy visited the various Lamziekte areas, and at his suggestion a number of plants were tested on their toxic effect on cattle.

The following is a list of the various plants tested:—

- |   |   |
|---|---|
| 1. <i>Aselepias fruticosa</i> .         | 30. <i>Rhynchosia nervosa</i> .               |
| 2. <i>Cassia mimosoides</i> .           | 31. <i>Rhynchosia Totta</i> .                 |
| 3. <i>Cassia obovata</i> .              | 32. <i>Salvia stenophylla</i> .               |
| 4. <i>Chrysocoma tenuifolia</i> .       | 33. <i>Scilla lanceoefolia</i> .              |
| 5. <i>Cissus</i> sp.                    | 34. <i>Solanum incanum</i> .                  |
| 6. <i>Cleome rubella</i> .              | 35. <i>Solanum supinum</i> .                  |
| 7. <i>Clematis brachiata</i> .          | 36. <i>Tarchonanthus camphoratus</i> .        |
| 8. <i>Commelina karooica</i> .          | 37. <i>Tephrosia capensis</i> .               |
| 9. <i>Convolvulus ornatus</i> .         | 38. <i>Thesium</i> sp.                        |
| 10. <i>Crotalaria capensis</i> .        | 39. <i>Vernonia Kraussii</i> .                |
| 11. <i>Dimorphotheca Zeyheri</i> .      | 40. <i>Walafrida densiflora</i> .             |
| 12. <i>Elephantorrhiza Burchellii</i> . | 41. <i>Ornithoglossum glaucum</i> .           |
| 13. <i>Crotalaria virgultalis</i> .     | 42. <i>Osteospermum muricatum</i> .           |
| 14. <i>Euphorbia sanguinea</i> .        | 43. <i>Geigeria betschuana</i> .              |
| 15. <i>Geigeria passerinoides</i> .     | 44. <i>Scirpus nodosus</i> .                  |
| 16. <i>Giesekia pharnaceoides</i> .     | 45. <i>Cyperus marginatus</i> .               |
| 17. <i>Grewia cana</i> .                | 46. <i>Ipomoea argyrioides</i> .              |
| 18. <i>Hoemanthus</i> sp.               | 47. <i>Listia heterophylla</i> .              |
| 19. <i>Hermannia brachypetala</i> .     | 48. <i>Cotyledon orbiculata</i> .             |
| 20. <i>Homeria pallida</i> .            | 49. Do. var.                                  |
| 21. <i>Indigofera cryptantha</i> .      | 50. <i>Kalanchoe thyrsiflora</i> .            |
| 22. <i>Indigofera arrecta</i> .         | 51. <i>Ranunculus pinnatus</i> .              |
| 23. <i>Lessertia tenuifolia</i> .       | 52. Fungus on <i>Ornithoglossum glaucum</i> . |
| 24. <i>Liliacea</i> sp.                 | 53. <i>Crassula turrita</i> .                 |
| 25. <i>Limeum viscosum</i> .            | 54. <i>Senecio bupleuroides</i> .             |
| 26. <i>Moraea polyanthos</i> .          | 55. <i>Senecio serra</i> .                    |
| 27. <i>Pentarrhinum inspidum</i> .      | 56. <i>Orphanthera jasminiflora</i> .         |
| 28. <i>Pollichia campestris</i> .       | 57. <i>Arctotis stoechadifolia</i> .          |
| 29. <i>Raphionacme</i> sp.              |   |

*Result.*

Some of these plants produced illness, *i.e.*, *Aselepias fruticosa* caused diarrhoea; *Cassia obovata* caused intense purging, and the animal died as a result of it; *Commelina karooica* produced signs of colic; *Hoemanthus* produced death; the animal fed with *Geigeria passerinoides* showed, after a month's drenching, vomiting, and continued to do so until the end of the test.

*In no case was Lamziekte noted.*

## THE GRASS TOXINE THEORY.

*Grass-feeding Experiments.*

Whilst the muzzled experiments had given such definite results, showing that the disease is contracted by ingestion, it was thought necessary to investigate whether it would be possible to produce the disease with grass cut on the Lamziekte veld. This grass should be given:—

- (a) Freshly cut and fed on cattle constantly stabled;
- (b) Grass turned into hay and fed on the cattle in the Laboratory at Onderstepoort and Grahamstown.

*The experiments with freshly cut grass* were undertaken at Besterspnt. They were started on 27th April, 1912, and discontinued in February, 1914. The



experiments were started with 8 cattle; 6 of these died, of which two were reported by the manager to have died of Lamziekte, and the remaining 4 were put down to malnutrition. One of the two cases was seen by Mr. Mitchell, who expressed the opinion that cause of death was due to acute Lamziekte. The diagnosis of the second case was not made by a professional expert.

Unfortunately, in the light of subsequent events, no reliance could be placed on this experiment, inasmuch as even in the positive case doubt arose as to whether the animal had constantly been stabled.

#### EXPERIMENTS WITH HAY OF LAMZIEKTE AREA

##### *Experiment at Onderstepoort.*

The grass was cut on portion of *Orlando Park*, the farm adjoining the experimental station, Kaffraria.

On this particular portion quite a number of cattle had died from the disease, on which account it had been evacuated by the proprietor. The hay was baled and trucked to Pretoria, where ten head of cattle were placed in a paddock and were fed exclusively with the hay over a period of several months.

A second experiment was started on *21st March, 1913*, when hay was obtained from the farm *Doornbult*, Bechuanaland, a farm where a recent outbreak of Lamziekte had carried off quite a number of cattle.

Twelve cattle were placed in this experiment; they were fed exclusively on this hay until 4th October, 1914, when the supplies were exhausted.

##### *Results.*

None of the animals fed on hay off a Lamziekte area sickened or died, and on the date of discharge the cattle were in a very poor condition, hay alone apparently not being sufficient for the maintenance of a good condition.

##### *Experiments at Grahamstown.*

Feeding experiments were also undertaken in Grahamstown, and the climatic and telluric conditions being here different to those of Western Transvaal or Bechuanaland, it was thought to put the grass of such areas to the test as well.

This experiment was started on the 6th May, 1912. The hay was obtained from the farm "Nurney," known as a Lamziekte farm. The precaution was taken to have control animals running over the same area from which the grass had been cut, and which cut grass was used for the feeding of cattle in the Laboratory, Grahamstown.

Ten head of cattle were put in the experiment. These animals did very badly, losing condition rapidly. In September, 1912, therefore, it was thought advisable to give them a supplementary ration of forage, mealie meal and bran; the ration not being sufficient to bring the cattle up again in condition it had to be increased in October. The experiment was discontinued a year later.

During the period of observation 7 cattle died. Two died after calving and the rest died of poverty. *None contracted Lamziekte.*

Of the twenty-three controls placed on Nurney at the same time and kept for the same period, 4 head contracted Lamziekte and died, shewing that *there is some difference in feeding cattle on hay off a Lamziekte area and on grazing the same on such an area.*

#### 2.—EXPERIMENTS AT ARMOEDSVLAKTE.

The experimental camp at Armoedsvlakte was opened through the assistance of the Vryburg Farmers' Association, who placed the farm at our disposal free of charge, and at the same time a sum of money was contributed on condition that it be spent on investigations on Armoedsvlakte.

The grasses found to be most prevalent were tested individually and cattle were fed on them over a prolonged period. The experiments commenced on the 16th May, 1912, when five animals were tied up in an open kraal and fed with the following grasses, viz., *Cynpobogon excavatus*, *Themeda forskalii*, *Digitaria ciliaris*, *Fingerhuthia* and *Eragrostis micranthus*, each animal receiving one grass exclusively, but as the season was winter and the animals fell off so rapidly in condition, *Tarchomanthus camphoratus* (vaal-bush), which had already been tested, was cut and fed to them at nights to be used as an additional food. Two other animals were tied up later and fed with the grasses *Aristida uniplumis* and *Antheophora pubescens*.

Schmidtia and Elionurus argenteus were also to have been fed, but could not be found in sufficient quantities.

The tests were suspended on February 2nd, 1913, owing to scarcity of grass and the extreme pooriness of condition of the animals then surviving.

During the whole of this test from May, 1912, to February, 1913, the grass fed was hard, dry and in-nutritious, and the animals very low in condition.

In the case of two animals, one fed with *Cympobogon excavatus* and the other with *Fingerhuthia africana*, death occurred rather suddenly, but the *post-mortem* examination did not unfortunately allow of any definite opinion being formed as to the cause.

The experiments were repeated in the year 1913, and were commenced on March 7th, when the following plants were fed:—

*Eragrostis micranthus.*  
*Cympobogon excavatus.*  
*Digitaria eriantha.*  
*Fingerhuthia africana.*  
*Themeda forskalii.*  
*Aristida uniplumis.*  
*Anthephora pubescens.*

One of the animals fed on *Cympobogon excavatus* died suddenly seven weeks after feeding was commenced, and at a time before it had perceptibly fallen off in condition.

It is to be regretted that in the feeding tests it was not possible to keep the animals in at least fair condition. Most of the animals were down with poverty before death, and this made it sometimes hard to arrive with certainty at the true cause of death. It was, however, shewn that at least one of the grasses, *Cympobogon excavatus*, the ordinary Turpentine grass, had toxic qualities, but the disease caused by it could not be identified with Lamziekte.

#### *Result.*

So far no conclusive proof could be obtained that grass off a Lamziekte area caused the disease. Nevertheless, the muzzling experiment can only be interpreted by assuming that the disease is somehow connected with the pasture.

#### *Camping Down Experiments at Armoedsvlakte.*

The experiments were started in January, 1912. The cattle had been obtained through the Farmers' Association from the farmers of Bechuanaland. The object of the experiment was to find out whether it was possible to locate a definite area in which the disease could be found, and to reduce that area to a minimum in order to thoroughly analyse the area as to the presence of anything that might be responsible for the disease. For this purpose the farm was divided into four camps and the "werf," on account of the "werf theory" brought forward in those days, was also utilised. In each camp 15 to 20 animals were to be grazed and watered. If, after a certain time, one camp showed a greater mortality, then such camp should be sub-divided into smaller camps in order to locate the disease.

From January, 1912, to March, 1913, in camp (a) 22 deaths occurred, in camp (b) 9 deaths, in camp (c) 10 deaths, and in camp (d) 3 deaths.

For convenience sake camp (c) was selected, on account of the water supply; 100 acres were fenced off and 30 head of cattle were transferred from camp (d).

By June, 1913, four deaths had occurred and this paddock was sub-divided into four 25-acre camps, in each of which 9 animals were placed, some of the original cattle remaining in the camps. No deaths occurred from Lamziekte.

In November, 1913, the cattle were removed to camp (a) and the kraals in camp (c) were kept empty.

#### *Result.*

It appears from this that when an area is getting grazed down the disease disappears and the observation coincides with that noted on the Vryburg Town Lands, which is grazed down to such an extent that a striking difference is noted in the mortality occurring there and in our paddocks adjoining, which contain plenty of long grass.

## SUBSEQUENT EXPERIMENTS TO CONTROL THE RESULTS SO FAR OBTAINED.

### AT KAFFRARIA.

#### 1. *Grazing and Muzzling.*

Owing to Smit's Kraal being such a great distance away from a railway station, and the unfavourable water supply for the new experiments that were planned on the results obtained so far, a new and more convenient place was looked for, and Kaffraria, near Christiana, was obtained. This place had a sad history of Lamziekte, the proprietor in despair having to give up cattle farming. The farm belonged to the Government, and we obtained permission to use it, and at the same time taking over practically all the cattle belonging to the former proprietor. On 24th March, 1912, Smit's Kraal was abandoned, and Kaffraria was occupied.

The experiments undertaken were partially a repetition of those at Smit's Kraal, *i.e.*, a lot of cattle to act as controls and to be allowed to run over the veldt. A muzzled lot, consisting of 10 cattle (later increased to 25), to be fed on hay from a non-lamziekte area. In order to meet the objections that the results of the experiments in Smit's Kraal did not exclude the interpretation of a deficiency disease the new experiments at Kaffraria were so arranged to meet this objection.

Accordingly, the additional 25 head of cattle were to receive an adequate supply of nutritious food, the idea being that this food would keep the cattle in good condition, but would not prevent them eating grasses; in other words the nutritious food should supply the deficiency of the Lamziekte veldt. This food consisted in a ration of (approximately) 2 lbs. of bran, 2 lbs. of mealie meal, 10 lbs. of Pretoria hay.

#### *Result.*

Five deaths from Lamziekte occurred, and one recovered within a period of six months in this lot, and only one case occurred in the control lot.

### THE TOXIC GRASS THEORY.

#### *Camping Down Experiments.*

Particular attention was paid to find out whether it would be possible to find a limited area on which the disease would be contracted, and, if so, a subsequent investigation should show what particular flora was connected with it.

For this purpose approximately 100 morgen had to be fenced off and divided into 7 camps. In some of these camps cattle were turned loose, and in others they were tethered, the cattle being moved from place to place as necessity occurred.

The tethered lots were discontinued on 10th May, 1912, owing to scarcity of grass and the fact that no cases of Lamziekte occurred on the farm. These tethered experiments were not repeated.

The remaining experiments were continued until 21st October, 1913. No deaths occurred in the cattle so exposed.

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These experiments were under the care of Mr. Mitchell until November, 1912, when Mr. Andrews relieved him, and was still in charge at the close of the financial year.

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I left for Europe in September, 1912, and Mr. Robertson was appointed Acting Director until my return in October, 1913.

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### THE PROGRAMME FOR 1914.

#### 1.—DAY AND NIGHT KRAALING EXPERIMENTS.

After my return from Europe new instructions were issued, the object being to test the accuracy of the statement to the effect that cattle running day and night contract the disease more than cattle kraaled by night and running by



day. The animals at Kaffraria were therefore divided into two batches, one of which had to be utilised for grazing by day and night, and one had to run by day and be kraaled at night.

#### *Result.*

Two deaths and one recovery occurred amongst the animals running by day and night, and three deaths in the batch grazing by day and kraaled by night, thus shewing that there was no difference in the incidence of the disease in the two batches.

### 2.—INOCULATION EXPERIMENTS.

Although previous observations had proved that Lamziekte could not be transmitted by inoculation, yet such a possibility was not disregarded, and I intended attempting to transmit the disease with bulky materials similar to those utilised in the transmission of East Coast Fever, where it was found that coarsely ground material injected into the jugular vein gave positive results, but finely ground material failed. Particular attention was to have been paid to intra-jugular injections of liver, kidneys and muscular tissues, but unfortunately conditions did not permit this work to be undertaken, and it still remains to be done.

### 3.—HISTOLOGICAL INVESTIGATIONS.

A new detailed examination of tissues had to be made in order to find out whether the lesions found would give a clue to the cause of the disease, for which purpose the muscles and nerves of various parts of the body had to be collected, whilst at the same time microscopical examination of all nerves and tissues were to be made. Particular stress was laid on the necessity of examining closely for any signs of degenerations of the tissues. The material thus collected was to be examined by the Pathologist for whose engagement arrangements had been made by me during my absence in Europe.

### 4.—THE AVITAMINOSIS THEORY AS APPLIED TO LAMZIEKTE.

While spending my time at the University of Basel, I submitted some pathological specimens obtained from Lamziekte cases to the Professor of Pathology, and at his request read a paper on South African stock Diseases. I introduced the subject of Lamziekte very fully, showing pictures of sick animals and explaining in detail the symptoms and the conditions under which the disease was contracted. As a result of this and the negative finding of the specimens submitted, particularly of the nervous system, Professor Hedinger suggested the possibility of the disease being due to a deficiency, closely allied to the Beri-Beri group and similar diseases, now, according to Funk termed Avitaminoses.

This was an entirely new aspect of the problem, as the deficiency of certain substances (hitherto unknown) the so-called Vitamines, was not suspected and the theory could quite feasibly be applied to Lamziekte.

#### (a) *Rice Feeding.*

Since no such diseases as Beri-Beri had been described in horses or domesticated ruminants, but could be produced in pigeons, fowls and in dogs, I decided to start experiments on my return by feeding rice on dogs, cattle, sheep, goats and horses, in order to see whether a disease could be produced in these animals, and if so, whether it resembled Lamziekte. These were started in October, 1913, and were still in progress at the close of the financial year, viz., 5 months after commencement of the experiment, but no disease had yet been observed resembling Lamziekte. The time that had elapsed was not considered long enough for any definite conclusions. On my return from Europe I found that Funk's Avitaminosis Theory was applied to Lamziekte by Mr. Stead in an article appearing in the *Agricultural Journal* of March, 1913. As Mr. Stead had obtained permission from the Minister to put this theory to a test, funds were supplied from our estimates for this purpose, and his experiments were commenced at the Groot-fontein School of Agriculture in February, 1914. At the conclusion of the financial year no definite results had been obtained.

As a control to these experiments it was thought advisable to undertake a similar experiment on cattle running in the Lamziekte area under the supposition that the lack of vitamins in both the rice and in the grass, should more rapidly bring about the disease.

Five cows in calf were therefore allowed to graze by day at Armoedsvlakte and receive in addition a ration of 5 lbs. of rice per head daily from the 6th January and by the end of the financial year one death had occurred from Lamziekte.

#### *Conclusion.*

Up to the end of the financial year no disease could be produced which resembled Beri-Beri.

#### *(b) Feeding Experiments with Various Rations.*

Since it was reported that the feeding of cattle reduced the mortality it was thought advisable to ascertain whether this was the case, and if so, what constituents of food-stuffs were responsible.

For this purpose the following experiments were undertaken:

- (1) Ten animals to graze by day and to be kraaled at night. (Controls.)
- (2) Ten animals to graze by day and to be kraaled at night, and in addition to receive every morning an allowance of treacle spread over hay sent from Pretoria.
- (3) Ten animals to graze by day and to be kraaled at night, and in addition to receive every morning an allowance of linseed oil spread over hay received from Pretoria.
- (4) Ten animals to graze by day and to be kraaled at night, and in addition to receive every morning an allowance of beans.
- (5) Ten animals to graze by day and to be kraaled at night, and in addition to receive every morning an allowance of treacle, bean meal and bran (balanced ration).

#### *Results.*

Up to the end of the financial year two animals in Lot 3 receiving linseed oil died of Lamziekte, one animal of the bean lot had a slight attack and recovered, one of the balanced ration lot (Lot 5) died of Lamziekte, one death and one recovery were noted in the bran lot.

#### *Conclusions.*

Although no special conclusion can be drawn as yet for these results, yet they point to the opinion that the disease cannot be absolutely prevented by extra feeding.

### MISCELLANEOUS OBSERVATIONS.

#### OBSERVATIONS ON INCUBATION TIME.

Several observations concerning the possible incubation time have been registered in the course of the experiments and which deserve recording, since they are contrary to the current knowledge of Lamziekte.

- (1) One animal had been stabled and fed for a period of 58 days with *Solanum supinum*, after which time it was turned out into the veld and died of Lamziekte 14 days later.
- (2) A cow and a heifer were sent from Pretoria on May 2nd, 1913, and turned into Camp "A." The cow calved on May 24th and was removed to Camp "B." where, on the 7th June or 36 days after arrival, she developed Lamziekte and died four days later. The heifer remained in Camp "A" and died on the 13th July, or 72 days after arrival.
- (3) In the muzzling experiments at Smitskraal it was noticed that two animals hitherto running on Lamziekte pasture contracted the disease on the tenth and twelfth days respectively after muzzling, during which period they had been exclusively fed on Pretoria hay.

These observations could be interpreted to the effect that there is no necessity for cattle to be exposed for any prolonged length of time on Lamziekte veld, or in other words that the toxin is not of necessity of an accumulative nature. The periods mentioned in the muzzling experiments would shew that this causal factor requires at least 10 days to produce symptoms of Lamziekte, in other words that the disease has an incubative period.

## PREVENTIVE TREATMENT.

## PASTEURELLA CULTURES.

The fact had been brought to my notice by Mr. Robertson, as explained before, that the inoculation of the so-called pasteurella cultures into cattle in the neighbourhood of Grahamstown acted as a preventive against the disease. Although no connection is presumed between Lamziekte and the pasteurella cultures, yet the results were too striking to be overlooked, and arrangements were accordingly made for tests on a larger scale.

The inoculations were carried out under the supervision of Mr. Andrews, in Kaffraria, and cattle of farmers belonging to the district of Bloemhof were inoculated; 1,191 cattle were inoculated between May and December, 1913, and subsequent experiments in Bechuanaland were carried out on 763 animals.

*Result.*

In a few instances the method failed more or less completely, but in the majority of cases the cattle were protected against the disease for a period of three to four months or even longer.

*Experiments at Armoedsvlakte.*

Sixty-three head of cattle were inoculated and exposed at Armoedsvlakte, of which 20 contracted the disease, 17 of them dying.

*Conclusion.*

It is evident that the inoculation of cattle with pasteurella cultures is by no means a certain method of preventing the disease, and it is possible that the apparent good results are connected with the somewhat spasmodic occurrence of Lamziekte.

## YEAST.

Following the argument that Lamziekte is an avitaminosis and that yeast contains a considerable amount of vitamins it was deemed advisable to ascertain whether the inoculation of yeast at intervals or in one injection would prevent the disease.

*Result.*

The tests were undertaken both at Armoedsvlakte and in the field. A total number of 224 cattle were inoculated in Bechuanaland. The disease broke out soon after inoculation, and owing to the formation of abscesses at the seat of the inoculation the method was soon given up.

*Conclusion.*

The injection of cattle with yeast did not prevent Lamziekte, and no difference could be detected between the susceptibility of the controls and the inoculated cattle.

## BLOOD INOCULATION.

The fact had been brought to my notice that farmers in the Western Transvaal, on the recommendation of Dr. Mathias, utilised the blood of animals suffering from Lamziekte, and reports had been received that such inoculations prevented the disease for some months. Accordingly, Mr. Andrews, who was in charge of the experiments at Kaffraria, was asked to enquire into the method and to obtain as much information as possible as to its applications and results. Mr. Andrews had an interview with Dr. Mathias and with Mr. McLetchie, the Justice of the Peace of Zandfontein, who supplied the information and the names of the farmers who had inoculated cattle, a full report was handed in, and conclusions arrived at by Mr. Andrews are as follows:—

## CONCLUSION AS TO THE VALUE OF THE METHOD IN GENERAL PRACTICE.

- (1) The inoculation of blood by Dr. Mathias' method gives in most cases useful results, similar to those obtained by the use of Anthrax and Redwater Vaccines and Pasteurella toxine.
- (2) The method has the advantage that the material for inoculation can be procured by the stock-owner on his own farm.

[U.G. 2—'15.]



- (3) Provided that the disease is not wrongly diagnosed and that the blood is not accidentally contaminated with any virulent organism there is no risk attached to the process, but there is serious risk that such mistakes will occur.
- (4) There is grave danger in putting this method into general practice in districts in which such diseases as Anthrax are prevalent on account of the comparative ease with which mistakes in diagnosis can be made.
- (5) It is probable that additional precautions to ensure the sterility of the blood to be inoculated would diminish rather than increase the efficacy of the method.

Accordingly, from this observation and from the fact that we were never able to reproduce the disease experimentally, we conclude that the immunity given by the inoculation of blood is not a specific or lasting.

As Mr. Andrews pointed out, the immunity is probably similar to that obtained by the inoculation of *Pasteurella toxines* or of any other vaccine.

It is, however, necessary to go further into the question of the production of a non-specific immunity, and it is hoped that this work will be undertaken during the forthcoming year.

#### INFORMATION CONCERNING LAMZIEKTE, OBTAINED FROM FARMERS.

In order to obtain as much information as possible from farmers concerning the condition under which the disease appears, and all peculiarities connected with it, query sheets were issued on two occasions. The first one already alluded to in 1910, for the farmers of the Western Transvaal, and the second one in 1912, for the farmers in all Lamziekte areas in South Africa. These query sheets were then worked out, and the results were published in the article "Facts and Theories about Stijfziekte and Lamziekte," summarised under a number of headings.

In order to come in personal touch with the farmers in the Lamziekte areas, and to have an insight into the state of affairs, a visit was made by Mr. Burt Davy and myself in Western Transvaal, Bechuanaland, Orange Free State, Western and Eastern Provinces of the Cape, and a number of farmers were interviewed, both on their farms and at meetings.

The results of these interviews are embodied in the article referred to, and due consideration was given to them when the cumulative toxin theory was brought forward.

The conclusions to be drawn from results of our experiments at Armoedsvlakte are that the information supplied to us by farmers do not always tally with the information collected at the experimental camps from observations on animals utilised in different experiments. The results of our experiments will help to modify the view which we had formed concerning the cause of the disease from the notes supplied by the farming community.

#### CONCLUSIONS UP TO 1912.

As a result of the *post-mortem* reports of my assistants, the few *post-mortems* I myself made on my visits, the experimental evidence so far collected with the muzzled animals, the constant negative results with the transmission experiments, the plant-feeding experiments, and based to a great extent on the information obtained from farmers, a theory was formed, both as to the nature of the disease and the cause of it, which theory represented our knowledge of that day, and should have the character as a working theory.

The main conclusion of that theory was: *Lamziekte is primarily a disease of the muscular system, caused by a toxin which accumulates in the muscles, and is obtained from grasses of certain regions where it is produced under the influence of certain climatical and tellurical conditions.*

#### OUR PRESENT VIEWS AND CONCLUSIONS.

In the light of the information collected from the feeding experiments at Kaffraria, and from the results obtained in Armoedsvlakte, the so-called Deficiency theory which was brought forward in a new form as indicating a

lack of substances (the so-called vitamins supposed to be necessary for the life of all animals) in the herbage of Lamziekte areas, will not explain the facts that have been collected.

1. Lamziekte is principally a disease of the muscular system, the nervous system being only secondarily attacked. So far it has been demonstrated microscopically that the central nervous system does not show any serious changes. Material has been collected and standing instructions have been issued to continue collecting in order to carry out histological examinations on as large a scale as possible. It is intended to submit this work entirely to a specialist, and with this view we have obtained the services of an authority in pathology.

2. The disease of the muscular system is due to the actions of toxins. In view of the fact that cases of Lamziekte can occur as early as 15 days after exposing susceptible cattle this toxin is not necessarily of a cumulative nature. It may still be so, but sufficient toxin may be produced or accumulated in a much shorter period than hitherto suspected.

3. The toxin is somehow connected with the feeding of grasses, but whether the grass as such, or whether something on the grass when ingested produces the disease, cannot yet be decided. The failure of all feeding experiments with freshly-cut grass and hay off Lamziekte areas would speak for the latter view.

4. The fact that in the muzzling experiment two head of cattle contracted the disease 10 and 12 days after they had ceased grazing, could be interpreted as indicating an incubative period.

5. The new investigations are principally directed into the pathological side of the question, with particular attention to the lesions typical of Lamziekte.





## APPENDIX IV.

## DIVISION OF DAIRYING.

ANNUAL REPORT, 1913-14.

The Secretary for Agriculture.

I have the honour to present the third Annual Report of this Division, being for the period ending the 31st March, 1914:—

## OFFICE WORK AND CORRESPONDENCE.

The Division is now installed in a compact block of offices in the basement of the east wing of the Union Buildings, whence it removed in October last, and now possesses a laboratory fitted up with all the necessary appliances for testing milk and cream. This laboratory has proved of great assistance, and will be of even more value in the future, when, as time permits, it is hoped to carry out certain experiments and investigation work which, up to the present, it has not been possible to attend to, owing to the fact that ever since its completion the staff, for various reasons, has been below strength.

During the period under review 2,538 letters were despatched and 2,216 received; in actual figures this shows a decrease over the correspondence dealt with during the period covered by my last annual report, but whereas my report for 1912-13 was for fifteen months this report only covers a period of twelve months.

This correspondence principally consisted of enquiries for advice from farmers in regard to almost every conceivable matter in connection with dairying and dairy farming. It is gratifying to note that farmers are making much more use of this Division as a means of obtaining information, and a great deal of time has been occupied in drafting replies which convey, in as simple language as possible, the desired knowledge; the principal matters upon which advice has been sought being the feeding and general treatment of dairy cows, arrangement and building of cow sheds (which usually involves the drawing up of plans for the guidance of the particular farmer), hand-rearing and feeding of calves, milk and cream cooling, and information in regard to suitable buildings for such purposes, butter and cheese-making on the farm, milk and cream testing, etc.

A good many applications result in a visit being paid to the farmer by one of the travelling instructors, and I am thus often put in touch with new districts and farmers where dairying has not previously been seriously developed. Whenever and wherever possible a dairy instructor is sent to visit a farmer requiring information, as naturally, advice given on the spot, after the individual difficulties and surroundings of a farmer have been duly studied and considered, is of the most practical use and value.

## STAFF.

I was appointed Senior Inspector of Dairying for the Union, and assumed duty on the 1st August last. On the 6th October, 1913, Mr. Challis, Superintendent of Dairying, left South Africa on an official tour of Australia and New Zealand, for the purpose of gaining information regarding the conditions of dairying, and particularly to enquire into the machinery under which the vast export trade of these countries has been built up and is controlled, in view of the possibility of the Union being in a position to export butter at no distant date. During the absence of Mr. Challis I acted as Superintendent of Dairying.

On the 30th April last, Mr. T. R. D. Carruthers resigned his appointment as Dairy inspector for the Cape Province, in order to take up the managership of the Darling Co-operative Creamery, and Mr. J. P. Gow, Lecturer in Dairying at the Elsenburg School of Agriculture, was appointed in his stead on the 17th September, 1913.

Mr. V. G. Zahn, Junior Dairy Instructor, resigned his appointment on the 31st January last, having accepted a position as manager of a farm in Natal; his place has not yet been filled, but the vacancy has been advertised, and it is hoped the services of a suitable man will be shortly obtained. When such appointment is made it is intended to station the officer at Maritzburg, to act as Dairy Instructor for the Natal Province.

In November last Mr. W. Oosterlaak, Dairy Instructor for the Orange Free State Province, was transferred to Pretoria to act in the same capacity in the Transvaal Province, while Mr. L. J. Veenstra, Dairy Instructor for the Transvaal, took over Mr. Oosterlaak's duties in the Orange Free State.

It will be noted that I have to report the resignation of two officers during a short period, both of whom received appointments at very much higher salaries outside the Service; it is certainly not in the interests of this Division, or of the development of dairying in the Union, that such frequent changes should take place, and I would point out that so long as highly-qualified and technical men are graded at such a low scale of salary they are bound to continue, and I feel it incumbent upon me, therefore, to request that the higher grading of instructors in this Division may receive your serious consideration.

#### AGRICULTURAL SHOWS.

The majority of Shows held in the Union during the period under review were visited by officers of this Division, who usually acted as judges of the Dairy Produce Section, as well as of the milk and butter-fat contests where required. Lectures were also given at a number of Shows; these, however, were for the most part very poorly attended, and it would appear that "Show" time is not a very propitious time for such lectures, the farmers having their time fully occupied with the many other features. Butter and cheese-making demonstrations were given at 12 Shows and were very well attended.

Butter-making competitions were held at the Rosebank and Witwatersrand Shows, the classes being well filled. Most of the competitors were students from the Agricultural Schools, and the standard of work reached was very good. Generally speaking, the classes for farm-made butter were poorly filled and the quality was very variable, although in some cases excellent, that shown at the smaller Shows being on the whole the best. This, however, may not be altogether regrettable, as it is no doubt largely due to the development of the creamery movement, which has resulted in farmers sending their cream to a creamery rather than making butter on the farm, except small quantities for household requirements. The policy of this Division has been to favour and encourage this course, which is in the interests of the industry generally, and essential before this country can export butter. Farm-made butter, as a whole, must always be unreliable and variable in quality by reason of the varying conditions under which it is produced, and will only demand a local market at comparatively low prices. The creamery butter exhibited was, on the whole, excellent, and the exhibits gaining awards, in my opinion, compared very favourably with what I have seen on the large Shows in other parts of the world. I should like to see exhibits from some of the leading creameries in South Africa sent to the London Dairy Show in the near future. I think the time has now arrived when it is desirable to bring South African butter to the notice of the British public, in view of the possibility of an export trade being developed at no distant date.

The dairy stock exhibited at all the more important Shows was distinctly creditable, and showed an improvement on what I have seen in former years. Milk and butter-fat contests were held at several Shows; competition was generally good and a great deal of interest was taken in the results. By means of these contests it is possible to ascertain the actual value of a cow as a dairy animal, which, after all, is what one wishes to get at, and such contests are an education to the farmer proving as they do that it is not always the best-looking animal which brings in the greatest return. It is of course argued by some that the results obtained at Shows are unreliable on account of the animal being in an excited state and not able to do itself justice. There is no doubt something in this, but when the animals are allowed a day or two in which to settle down before the contest commences, and a suitable building is provided, approximately normal results are obtained, and in any case the advantages far outweigh the disadvantages, and I hope to see many more societies introducing these contests in their next prize lists.



Several of these competitions have been judged under the rules of the British Dairy Farmers' Association, which awards points for lactation periods, lbs. of milk, butter-fat, and solids not fat, while deductions are made each time the quality of the milk falls below a standard of 3 per cent. butter-fat and  $8\frac{1}{2}$  per cent. solids not fat. It has, however, been contended by some breeders that these rules unduly penalise the Friesland breed and that they are not suitable for South Africa. To settle definitely what rules contests should be judged under and adopted uniformly by all agricultural societies, it is desirable that a conference should be held of the breeders and persons interested, and it is hoped to arrange for such a conference to be held before next Show season.

Another useful class included at some of the Shows was for the "best hand-reared calf." I would like to see similar classes at all the Agricultural Shows, as it will be essential for this rearing of calves to become universal in South Africa before we can hope to rank as a great dairying country. These classes are an education to farmers, some of whom are still sceptical as to whether a calf will develop and grow properly when not reared by its dam.

Altogether 46 Shows were attended by officers of this Division, at 43 of which the duties of judging were performed. Personally, I attended 13 Shows, at 12 of which I acted as judge, while 10 lectures and 7 demonstrations were also given.

#### CREAMERIES.

Somewhat of a lull has taken place during the past year in the establishment of new creameries, possibly as a result of a warning to proceed cautiously in this direction, which this Division considered it advisable to issue about twelve months ago, and no new creameries have been opened in the Union during the past year, though one large one is, however, now in course of erection in Natal. The policy outlined in The Superintendent of Dairying's last Annual Report in connection with the establishment of new creameries has been carried out. I am, however, of opinion that in the near future, it may be possible to advantageously establish one or more creameries in the districts where ostrich farming is at present so extensively carried on, and it will certainly be in the interests of the farmers in those districts to take up dairy farming more seriously and, so to speak, not have all their eggs in one basket; as a slump in the feather market, like the one which at present exists, can then be viewed with greater equanimity. I have no hesitation in stating that dairying will produce better returns from the fine lucerne lands in the districts referred to, than any other line of farming, except perhaps the Ostrich Feather industry itself.

I have also great expectations from the extension to, and greater developments of, the dairy industry in the coastal belts, now that systematic dipping has been made possible the successful keeping of cattle in these areas; the fact that the rainfall is more reliable and favourable in these districts than most other parts of the Union makes them particularly adaptable for dairy farming. Generally speaking, the past year has not been at all favourable to the creameries as, on account of the drought experienced in most parts of the Union, cream supplies have been greatly reduced, though not to the extent which might have been expected, which may be attributed to the extension of dairy farming, and to the fact that many farmers who previously did not consider it worth their while to sell cream are now doing so, while the gradual improvement of the cattle in the Union is also having some effect. The creameries in the Orange Free State Province have been the most seriously affected, while on the other hand those in the Natal Province have had quite a successful year.

The itinerant instructors of this Division have done a considerable amount of good work in travelling among the farmers supplying to the Creameries, and explaining the basis on which cream is purchased as well as the numerous causes of a varying test, with the result that I am informed that much less dissatisfaction exists and fewer complaints in regard to incorrect tests are received by the Creameries than formerly. There is, however, still a great need for instruction required in this direction; the majority of creameries now test each can of cream delivered to the factory instead of taking composite tests, the former being by far the more satisfactory method.

I am of opinion that it would be decidedly to the advantage of Creameries if some system of Government inspection of the cream-testing carried out at creameries could be introduced; for this purpose a comprehensive Dairy Act for the whole of the Union would be required, giving officers power to inspect at any time the testing operations and payment made at any creamery.



## CHEESE FACTORIES.

The cheese-making industry has been very severely affected by the continued drought during the past year, and a large number of farmers who have been making cheese on their farms and have not been able to carry on at all owing to there being no milk available; consequently progress in this direction has been somewhat retarded. One fairly large factory, however, has recently been started in the Transvaal, sweet milk cheese is manufactured and I expect it to be very successful. There are no doubt many suitable districts in the Union for the establishment of cheese factories not served by existing creameries, where it is anticipated sound businesses may be started when better seasons come along. Meetings have already been held at several centres and preliminary steps taken.

## DAIRY STATISTICS.

After considerable difficulty I have been able to ascertain, approximately, the amount of butter and cheese produced in the Union; in some cases, however, figures were unobtainable, and have had to be estimated; and in this connection I would state that I consider it is highly necessary, in the interests of the dairy industry, that reliable dairy statistics should be compiled and published annually. Without legislation making it compulsory for creameries, butter and cheese factories and farmers to supply particulars of their output, however, it is well nigh impossible to obtain the same. While on this subject I would also like to bring to your notice the desirability of statistics being compiled annually, giving the number of cows in milk, heifers, etc., in the Union, in order that it may be possible to arrive at the average amount of milk and butter produced per cow, as in other countries, and thus be in a position to compare the improvement, or otherwise, from year to year.

*Butter produced in the Union during the Year Ending 31/12/13.*

	lbs.
Produced by Creameries ... ..	7,659,748
Produced by Farmers and sold on Markets ... ..	2,237,219
Produced by Farmers and sold to Merchants ... ..	844,778
	<hr/> 10,741,745 <hr/>

which at a fair market price may be valued at £626,601.

*Cheese produced in the Union during the Year Ending 31/12/13.*

	lbs.
Produced by Factories and Private Cheeseries ... ..	520,849
valued at £18,446.	

Compared with the previous twelve months the figures relating to butter show an increased output of 302,745 lbs.; although this increase is comparatively small, and certainly not as great as one could wish, in view of the terrible drought prevailing in most of the areas which are mostly devoted to dairy farming, it is considered highly satisfactory that any advance at all has been made. The fact that under adverse circumstances the industry has been able to hold its own, and even slightly advance, speaks volumes for the future and encourages one in the belief that when a good season again comes along sufficient butter will be produced in the country to supply the needs of the Union and the long-hoped-for establishment of an export trade will not long be delayed.

## IMPORTATIONS.

The importation of butter into the Union shows the following decrease, viz.:—

Year.	lbs.	£
1912 ...	4,925,188	262,402
1913 ...	3,893,036	188,471

*being a decrease of 1,032,152 lbs.=£73,931.*

Of the butter imported during 1913, 204,202 lbs.=£10,414, was re-exported to places outside the Union.

The importations of cheese, on the other hand, have somewhat increased, the figures being as follows:—

Year.		lbs.		£
1912	...	5,165,715	...	158,787
1913	...	5,586,244	...	167,440

being an increase of 420,529 lbs. = £8,653.

The reason for this increase may be partly attributed to the reduced quantity of cheese manufactured in the country, and partly to the probable increased consumption.

#### EXPORTATIONS.

Of dairy products manufactured in the Union the following were exported to places outside of same, viz.:—

<i>Butter.</i>			<i>Cheese.</i>		
397,106 lbs.	...	£27,839	27,299 lbs.	...	£1,256

#### IMPROVEMENT OF CATTLE.

During the past few years a number of first-class herds of dairy cattle have been built up by progressive farmers in the Union. The standard of cattle kept by the average farmer, however, is still very low, necessitating the gradual and steady grading up of the existing stock of the country, and this can only be accomplished by culling out all "robber" cows in the herd, which unfortunately are very numerous. In order to ascertain which are the "robber" cows, regular weighing and testing of the milk is necessary, and cows which are found incapable of producing a payable quantity of milk should at once be withdrawn from the herd, and not, as is a very common practice, retaining same with the idea of such cattle being a profitable proposition. The majority of farmers, however, have not the time to devote to the keeping of such records, and the best solution to this difficulty is found in the establishment by farmers, in comparatively easy distance of each other, of Cow-Testing Associations, which have proved highly successful as well as beneficial in other countries. Officers of this Division are consequently doing everything possible to inform farmers of the advantages of such Associations and the best methods of developing same. The fact that Government have under consideration the granting of financial assistance to such Societies will no doubt act as an incentive when such assistance is actually forthcoming. Two Cow-Testing Associations, viz., Darling and Mooi River, are already well established and are doing excellent work, and I have every hope that their example will be followed and several similar Associations formed during next season, when it is trusted the existing drought which has so retarded progress in this direction will be completely broken.

Another matter on which I would like to touch upon is the establishment of an "Advanced Registry" for dairy cattle in South Africa, under which official certificates can be issued when the conditions laid down are complied with. Such a registry is, I consider, highly desirable in this country, and the time for its establishment has now arrived. Mr. Challis is collecting valuable information in regard to this matter in Australasia, and on his return it is hoped to bring forward a concrete scheme applicable to the conditions of this country.

At this stage I would like to point out that the present state of the dairy industry is quite satisfactory and only good seasons are needed to ensure its rapid advancement.

In conclusion I wish to express my appreciation of the loyal support accorded me by all officers of this Division during the absence of the Superintendent of Dairying in Australia, and particularly the conscientious work performed by Mr. Hosking, whose numerous duties in this Division are, from my personal experience, far too heavy for one officer to continue to perform, and whose knowledge of the working of the Division proved invaluable to me.

E. G. HARDY,

Acting Superintendent of Dairying.





## APPENDIX V.

## DIVISION OF BOTANY.

ANNUAL REPORT, 1913-14.

Pretoria, 26th August, 1914.

## INTRODUCTION.

The Division of Botany now comprises the two divisions which previously existed as the Division of Botany and the Division of Plant Pathology and Mycology.

This amalgamation was decided upon in October last on Mr. J. Burt-Davy's resignation, and from which date I assumed charge of the Division.

On taking over the duties and responsibilities of an established institution one naturally cannot help reviewing the work carried out by one's predecessor. The botanical section has in the past been concerned with work of a more or less general nature. Mr. Burt-Davy devoted his attention mainly to seed and plant introduction, maize breeding and selection, and the identification of plants, including poisonous plants and noxious weeds.

The amount of work that was attempted year after year bears ample testimony to Mr. Burt-Davy's remarkable energy and alertness, and it will suffice to say that he has been instrumental in introducing useful hay crops, valuable winter pasture plants, and a large number of varieties of maize, many of which are now well established in various parts of the Union. In fact, the careful attention that maize growers are now giving to seed selection, combined with the high standard and quality of maize that is exhibited at our Agricultural Shows, may I think largely be ascribed to Mr. Burt-Davy's labours and personal efforts on behalf of the maize industry of the country.

## WORK OF THE YEAR.

The headquarters of the Division are maintained at the Phytopathological Laboratory. Considerable improvements have been made during the year to the grounds surrounding the laboratory. These have both given it an air of a botanical institution, and at the same time made much waste ground available for experimental purposes. A substantial fumigation house has been built in close proximity to the laboratory and has already proved useful for experiments connected with the fumigation of potatoes and other problems.

The botanical section is, unfortunately, still housed at some distance away in a private dwelling house at the corner of Wessels and Church Streets, and great inconvenience is caused by this fact.

The work of the Botanical Station at Groenkloof is severely handicapped by the unsuitability of the site and the uncertainty of its future.

The Station at present is traversed by many public paths and roads, and in spite of police protection and fencing many of the experiments have been rendered useless through theft and wilful damage. As it has been doubtful whether the Botanical Station will be maintained at Groenkloof or removed to a more suitable and convenient site, it has not been deemed advisable until the matter is finally settled to lay down permanent pastures and crops.

The botanical work of the Division was only transferred to my charge during the last six months of the period under review. For the six months prior to this Mr. Burt-Davy was absent on leave in Europe, during which time the Division was placed under the care of the Chief of the Tobacco and Cotton Division, when the Botanical Staff only consisted of a Herbarium Assistant, a Clerical Assistant, and a Manager of the Botanical Station. Under these circumstances it was only possible to follow out the lines of work laid down by Mr. Burt-Davy prior to his departure on leave.

## STAFF.

Mr. J. Burt-Davy, F.L.S., resigned his position as Agrostologist and Botanist on the 30th September, 1913.

Miss A. Bottomley, B.A., was appointed to the Pathological Section on the 1st July, 1913, while Mr. A. O. D. Mogg, B.A., was appointed to the Botanical Section on the 19th September 1913.

## CORRESPONDENCE, ETC.

During the year 2,264 letters and telegrams were received, while 2,136 were despatched. Some 500 scientific bulletins and periodicals were also indexed and filed away.

## BOTANICAL EXPERIMENT STATION.

The carrying on and taking over of the work at the Botanical Station was complicated by the fact that Mr. Turner, the Manager, did not take charge of the Station until just before Mr. Burt-Davy went on leave, and consequently was placed at a distinct disadvantage in not knowing with what object many of the experiments had been laid down.

The total rainfall for the year at the Botanical Station amounted to 24.59 inches. Although this would appear to be ample for average results, most of the rain fell in torrential showers, and consequently did not do as much good as it might otherwise have done.

## MAIZE.

With maize alone 226 experiments were laid down, most of which were tests to determine the inheritance of various characters.

In some ear to row tests which were carried out the best results obtained were:—

Chester County (Yellow dent), average weight of ear per plant ...	10.4	ozs.
Early Hickory King	10.2	„
Mercer	8.7	„
Noodsberg	7.6	„
Reid's Yellow dent	6.7	„
Funk's 90-Day	5.07	„
Johnson County X Iowa Silver Mine	5.0	„

## GRASSES.

During the period under review nothing was done towards introducing new grasses, but the work that has been carried out with the Tall Fescue (*Festuca arundinacea*) demonstrates clearly that no difficulty whatever should be experienced by seed growers in obtaining an ample supply of clean seed from the plants raised in this country. At the present time seedsmen in South Africa find great difficulties in obtaining this seed from New Zealand free from ergot.

## LUCERNE.

Some six varieties of lucerne have been grown at the Station, viz.:—

Algerian,  
Chinese,  
Peruvian,  
Provence,  
Tamworth,  
Turkestan.

Of these, Tamworth is undoubtedly the best for this District. It yields heavier and stands the drought and cold better than the rest. The Peruvian comes next in order of merit.

## SPINELESS CACTUS.

Five varieties of Spineless Cactus have been grown, viz.:—

*Opuntia morada*,  
*Opuntia anacantha*,  
*Opuntia coccinellifera*,  
 Algerian,  
 Cape Kaalblad.

Over five hundred cuttings of these plans were disposed of to farmers; in fact the demand was greater than we could supply.

## BOTANICAL HERBARIUM.

During the year 1,200 specimens were submitted for identification. These included noxious weeds, poisonous plants, fibre plants, grasses, and other plants of economic value. Miss Stent dealt with practically the whole of this work, and it naturally took up so much of her time that she has had little opportunity of devoting herself to systematic or descriptive work. The junior Herbarium Assistant's time was fully occupied in mounting and labelling the specimens, and some 21,000 sheets still require mounting and labelling.

A catalogue of all the plants collected by Mr. Burt-Davy in the lamziekte regions was also completed.

From the number of specimens that have been sent in for identification with requests for information as to their economic value, it is evident that farmers and others are beginning to take a considerable interest in the indigenous flora of the country, and are anxious to exploit its vast possibilities.

## POISONOUS PLANTS.

During the year three suspected plants have been proved by feeding tests to be definitely poisonous, viz.:—

1. The Natal Slangkop (*Urginea macrocentra*).
2. *Cassia arachoides* Burch.
3. *Senecio pterophorus* D.C.

## THE NATAL SLANGKOP.

Specimens of this plant were submitted by W. A. Deane, Esq., of Sevenoaks, Natal, who, in an accompanying letter, stated: "We have suffered rather heavy losses of cattle through their eating a kind of lily known as 'Slangkop.' It is only in the spring months, and more especially if the rains are later than usual, that these losses occur. The poison contained in this lily is very virulent, and death follows within 48 hours in some cases. *Post-mortem* shows violent inflammation in the intestines and third stomach, and no quantity of oil or Epsom salts will cause the bowels to act when a beast has eaten this lily in quantity. The result is that 99 per cent. die; one of my neighbours lost 18 head."

The plant was identified as *Urginea macrocentra*\* and as we had no definite information as to whether it was actually poisonous or not, arrangements were made with the Director of Veterinary Research for the carrying out of a feeding test at the Pietermaritzburg Laboratory by Mr. A. W. Shilston. The result of the test was as follows:—

"An ox, 6 years old, was fed with 26 bulbs of the 'Slangkop,' cut up and weighing 2½ lbs., on the 18th December. It became sick immediately, and though various antidotes for poisoning were tried on each of the following days the animal died on the 23rd December, apparently in great pain. A *post-mortem* examination revealed the lesions of acute gastro-enteritis.

The Slangkop is generally found in moist ground, and is only eaten when young and when grass is scarce.

*Cassia arachoides* Burch.

This plant was submitted by a farmer from the Schweizer Reineke district in the Transvaal, who complained that it was the cause of Gal Lamziekte. The correspondent stated that the plant should be wetted so that it became fresh

\* Note on the Natal "Slangkop" or "Poison Bulb" (*Urginea macrocentra* Baker) by Dr. J. Medley Wood. *South African Agricultural Journal*, Vol. VII, No. 5, p. 703.



again. It should then be placed in the sun and allowed to wilt and then immediately fed to cattle. About two hours after feeding the cattle should be watered.

The plant was tested by the Director of Veterinary Research at the Experimental Station at Armocdsvlakte, near Vryburg, who has kindly supplied the following information regarding the test:—"Two animals were drenched during a period of 45 days, in which time 100 lbs. 6 ozs. of the plant were used. The officer in charge of the Station reported 'the animals purged constantly and soon lost condition. After three weeks bluish white films formed over the eyes of both animals. Their eyes watered and hair fell from neck and head. After release from the experiment one animal was very weak and showed much nervous excitability. It died five days after release, showing symptoms of poisoning.'"

Several closely related species of *Cassia* yield Senna.

Specimens of *Cassia arachoides* Burch. in our Herbarium have been obtained from Vryburg, Christiana, Magaliesberg and Zululand.

#### *Senecio pterophorus* D.C.

The plant was submitted for determination by the Director of Veterinary Research, who received specimens from the Veterinary Research Laboratory, Grahamstown, in February last, with a statement "that in the camp in which these plants were growing the owner has lately lost four head of cattle with all the symptoms of *Senecio* poisoning (Molteno cattle disease).

Feeding tests were carried out later at the Grahamstown Veterinary Research Laboratory, the results of which are not yet to hand.

### NOXIOUS WEEDS.

A draft Agricultural Seeds Bill has been prepared and will, I trust, be introduced at the next session of Parliament. The seedsmen in South Africa generally will welcome such a Bill, and they themselves state that seed of very inferior quality is sent to this country year after year, and that much impure South African-grown seed is circulated within the Union.

During the year a good deal of discussion arose over the Malta thistle, *Centaurea melitensis*, and its inclusion among the proclaimed noxious weeds has been urged by many.

The weed was reported to us from the following localities in the Union: Rouxville District in the O.F.S., Alexandria Division, Manley Flats, Uitenhage, Kingwilliamstown and Bedford in the Cape Province, Pretoria and Klerksdorp in the Transvaal. The plant is a native of the Mediterranean region and has spread to most of the warm countries of the globe.

After carefully considering the matter, the Division recommended that the Malta thistle and two closely related species, namely, *Centaurea solstitialis* Linn. and *Centaurea calcitrapa* Linn., which are not as yet so widely spread, be included amongst the proclaimed noxious weeds.

Another weed that has been introduced into the country and bids fair to become a nuisance if not carefully watched is the Water Hyacinth, *Eichornia crassipes*.

It appears that the plant has been grown for some time for ornamental purposes in public and private gardens. A case was brought to our notice in which it was responsible for choking up a dam near Worcester in the Cape. A proposal was made to clean the dam by carting away the plants and tipping them into the Breede River. However, this dangerous suggestion was prevented, and an illustrated article of the weed was published by Miss Stent in the *Agricultural Journal*.

### NATAL HERBARIUM.

When the Natal Herbarium passed over to this Division in April, 1913, the staff consisted of only Dr. J. Medley Wood and Miss Franks. On August 19th Miss Franks came to Pretoria on duty in connection with the publication of "Natal Plants," and while here was taken ill and compelled to go on sick leave until February 2nd, 1914. During the whole of this time Dr. Medley Wood was without any assistance. In spite of this, steady progress has been made at the Herbarium, and Dr. Medley Wood reports that "the number of mounted sheets has been increased from 44,327 to 47,299, an increase of 2,972 specimens, chiefly of foreign species, but amongst the South African ones are a large number donated by M. S. Evans, Esq., C.M.G., F.L.S., and a still larger

number from Mrs. Dieterlen, consisting of Basutoland plants collected by that lady near Leribe, and for whom a large number of specimens had been examined and named here. From Mr. Roudabis, of Dumisa, Natal, and from Mr. Thorncroft, of Barberton, smaller but excellent samples have been received and placed in the cabinets. Several parcels of dried and named specimens of indigenous plants have been sent away in exchange. Many have been received for examination from persons in Natal and other parts of the Union and lists of the names have been sent to the applicants."

#### PLANT DISEASES.

In spite of the long continued drought which was experienced again during the past year, 387 specimens of diseased plants and parasitic fungi were submitted for examination and report. The majority of these specimens were composed of the commoner pests that usually occur year after year on the ordinary farm crops and have already been recorded in my previous reports, but in addition to these a number of obscure troubles relating to wheat, maize, tobacco, cotton, lucerne and other plants were encountered during the period under review. Many of these are undoubtedly due to bacterial and mycelial infections from the soil, and little can be done towards their elucidation until the necessary facilities for conducting pot culture experiments, which are essential in work of this kind, are provided.

Very satisfactory progress has been made with such work and investigations as it was possible to undertake with the equipment at our disposal, but much of this would have been facilitated and rendered more complete if the necessary greenhouses and infection houses were available. Until these essential adjuncts to the laboratory are forthcoming, many important investigations have to remain in abeyance.

The most important diseases noted during the year, and which have hitherto been unrecorded from South Africa, are:—

1. Club-root or Finger-and-toe in cabbage and cauliflower caused by *Plasmodiophora brassicae*, Woronin.
2. Cabbage stem rot caused by *Phoma brassicae* Thum.
3. Loganberry disease caused by *Hendersonia rubi*, Westendorp.

#### CLUB-ROOT OR FINGER-AND-TOE (*Plasmodiophora brassicae* WORON).

This well-known pest was first brought to our notice in April, 1913, when specimens of affected cauliflowers were submitted for examination.

From enquiries made on the spot it would appear that the trouble has been known in the Cape Province amongst cabbage growers for the past fifteen years. It is prevalent around Stellenbosch, Bottelary and Kuils River. Cabbages and cauliflowers are most severely affected from December to April on all moist ground. No complaints have as yet been made with regard to turnips affected with this pest.

#### CABBAGE STEM ROT (*Phoma brassicae* THUM).

This trouble, which occurred on thousand-headed kale, was submitted by a grower at Polela in Natal, who reported that out of 16 acres of cabbages 12 acres were completely destroyed, while 30 per cent. of the remaining 4 acres were affected. The fungus, *Phoma brassicae* Thum., is a well-known parasite in France and the United States, where it does considerable damage to the cabbage crop. It is now recorded for the first time from South Africa. The stem of the plant is usually attacked first. The infected areas form elongated depressed patches which run one into the other and then soon extend into the centre of the stem. As soon as a plant is attacked the leaves turn yellow and the plant quickly becomes a rotting mass.

#### LOGANBERRY DISEASE (*Hendersonia rubi* WESTENDORP).

This disease, which causes a considerable amount of trouble to raspberry and loganberry growers in Europe, has made its appearance on loganberry plants at Stellenbosch in the Cape Province, and was first brought to the Division's notice in August last. It is quite possible that the fungus may also be present on the native species of *Rubus* in that district, but up to the present there is no positive proof of this.



At Stellenbosch the fungus, in addition to attacking the stems of the loganberry plants, also does considerable damage to the foliage. I think there can be little doubt but that the disease must have been imported along with infected cuttings.

#### CRYPTOGAMIC HERBARIUM.

Miss Bottomley, B.A., who joined the staff of the Division in July last, has taken charge of the cryptogamic herbarium. During the year 2,651 specimens were added. These have all been registered, mounted, indexed, and filed away. All the specimens in the herbarium are in good order and comprise a most valuable collection of fungi.

#### THE ANATOMY OF *Acacia mollissima*.

Mr. van der Byl, M.A., completed his study of the anatomy of *Acacia mollissima* which was undertaken as a preliminary to working up the trouble known as "Black spot," "Gumming," or "Mottling" of the Wattle. In this investigation attention was given to the distribution of tannin in the various organs of the plant, and it was shown clearly that at present a large amount of tannin is allowed to go to waste. For this reason alone it would be greatly to the interests of wattle growers if measures were adopted whereby the tannin could be extracted in Natal.

The result of this investigation was published under the title "The Anatomy of *Acacia mollissima* with special reference to the distribution of Tannin" in Science Bulletin No. 3 of this Department.

#### "BLACK SPOT" OR "MOTTLING" IN WATTLES.

This trouble caused considerable alarm amongst wattle growers in Natal a few years ago. As its nature was unknown, a detailed study of the trouble was undertaken by Mr. Van der Byl, M.A., as soon as he had made himself familiar with the anatomy of this tree under normal conditions.

Mr. Van der Byl has shown that the trouble is not caused by any contagious organism, but is due to physiological disturbances caused by unfavourable conditions, such as great irregularities in growth or too rapid growth.

The disease is characterised by the presence of dark sunken spots on stem. In these, later on, rifts may appear through which gum exudes. In advanced stages of the disease the stem may become blackened all the way up.

Mr. Van der Byl finds that "the gum is formed by the walls of the soft bast cells becoming modified into gum. The middle lamellæ of adjoining cells first change into gum, the remaining lamellæ follow, and ultimately the cell contents become added to the gummous mass. This gummous modification extends, and results in the formation of gum pockets in the phloem. The gum pockets are always in close association with the hard bast fibres.

"The cell contents in the gumming area exhibit nothing of peculiar interest and as far as the cell walls are concerned the only difference is that the soft bast next to the hard bast have their walls cuticularised. In severe cases the cell walls of the hard bast and medullary rays undergo gummous modification in a way similar to what happens in the cells of the soft bast.

"Two healing processes set in:—(i) Where the gumming has not extended to the wood a secondary cambium forms in the phloem beneath the gum pockets. This cambium joins on to the phyllogen and by its activity the diseased area is sloughed off; (ii) where gumming has extended to the wood resulting in open wounds the wound becomes healed over by a calous growth. Frequently hard bast bundles of the old phloem become enclosed between the old wood and the wood formed over the wound."

Mr. Van der Byl also shows that tannin is absent in the gumming area of diseased trees.

The detailed investigation of this subject was published by Mr. Van der Byl under the title "A Study on a 'Mottled Disease' of the Black Wattle," as Science Bulletin No. 4 of this Department.

#### COCONUT PALM DISEASES AT QUELIMANE, PORTUGUESE EAST AFRICA.

In September last, at the request of His Excellency the Governor-General of the Province of Mozambique, I visited the Coconut Plantations of the Campanhia da Zambesia, at Quelimane, for the purpose of reporting upon the diseases prevalent there.



I left Pretoria on August 29th and returned on the 25th September. I visited the Coconut Plantations at Cololo, Coalane, Gogone, Berbede, Maquival, Longe, Idugo and Namerumo.

The diseases noted in the plantations were:—

1. A leaf spot disease.
2. A bud rot.
3. Non-setting of the fruit.
4. Dropping of immature nuts.
5. Barren palms.
6. Chlorosis of palms.

#### 1. *Leaf Spot.*

This trouble was general throughout the plantations. No single full-grown palm was free from the disease. The spotting is due to the fungus *Pestalozzia palmarum* Cke. Young palms were noted to be peculiarly immune to the fungus.

Although the general health of the palm must be considerably impaired by this pest, and although it might be appreciably checked by spraying with Bordeaux mixture, I do not consider the spraying of plantations such as these against this fungus a practical proposition.

#### 2. *Bud Rot.*

Although they were few and far between, typical cases of bud rot were seen at Coalane, Berbede, Idugo and Namerumo. That little evidence of this serious disease is to be seen in the plantations is due to the up-to-date and prompt measures adopted in dealing with the pest. As soon as any symptoms of the disease are apparent in the palms affected trees are cut down and burnt.

#### 3. *Non-setting of Fruit.*

A large number of palms were noted which, although they were apparently healthy and flowered regularly, set little or no fruit. If this trouble could be remedied the yield of nuts per tree would be very materially increased.

#### 4. *Dropping of Immature Nuts.*

In all the plantations visited, with the exception of Namerumo, fully fifty per cent. of the palms drop a large proportion of nuts before they are mature. The nuts fall at all stages of growth, from the time that they are no bigger than walnuts until they are almost full grown. Observations made in the field indicate that this dropping of immature nuts is due to one or more parasitic fungi. The trouble undoubtedly accounts in a large measure for the low yield of nuts per tree in the plantations mentioned above.

#### 5. *Barren Palms.*

At Coalane, Gogone, Berbede and Idugo a large number of palms fifteen years old and upwards were found to be barren. In some cases the palms appear quite healthy, in others they have a somewhat sickly appearance. In most instances no external evidence of the flowering shoot can be seen in these palms, which naturally bear no fruit. In other cases, however, the flowering shoot may be visible in the spear stage, but it then usually dies off before the flowering bud opens.

#### 6. *Chlorosis of Palms.*

This trouble was present chiefly in the vleis grounds of the plantations and was most pronounced in young palms ranging from two to five years old. The palms affected had a very unhealthy yellow appearance. The cause of the trouble can, I think, be safely ascribed to the poorly ventilated soil surrounding the roots. As soon as these low-lying places become better drained and the soil thereby better ventilated, I am of opinion that the trouble will disappear.

Of the above diseases there can be no doubt that the non-setting of the fruit, the dropping of the immature nuts, and the barren palms considerably reduce the yield of nuts below that which should normally be obtained from these plantations.

The diseases in question are not readily detected at first sight by those familiar with the plantations, simply because the palms do not attract attention in the same way as those affected with a disease such as Bud Rot where the palms suddenly wilt off and become a conspicuous object to all in the near vicinity.

Subsequent studies in the laboratory at Pretoria of the material brought with me from the plantations showed that there are six distinct troubles present.

- (1) A leaf spot due to *Pestalotzia palmarum* Cke. which is also present in the indigenous palms of the district.
- (2) A bacterial disease of the palms causing bud-rot due to an organism identical with *Bacillus coli* (Escherich) Migula, and which is also responsible for the barrenness in the palms.
- (3) A fungous disease of the young nuts caused by a species of *Gloeosporium*
- (4) A fungous disease of the young nuts caused by *Diplodia palmicola* Thun.
- (5) Failure of a large percentage of flowers to set fruit, and undoubtedly due to defective pollination.
- (6) Chlorosis, due to planting in badly-ventilated and insufficiently-drained soils.

#### WATTLE BAGWORM FUNGUS.

During the year a considerable amount of work was carried out in connection with the production of the bagworm fungus. Although the method of cultivating the organism has been considerably improved upon, and over a thousand cultures were distributed amongst the chief wattle-growers in Natal, the results obtained were far from satisfactory. The season was exceptionally dry, and from every aspect a most unfavourable one for the spread of an epidemic of this kind. The experience gained, however, has made it clear that the fungus must be prepared in such a form that it will be available whenever a favourable occasion offers, and with this end in view experiments are now being conducted.

From observations which I have made there is no doubt that the fungus is becoming more widely distributed in the plantations year by year, and were it not for the fact that the wattle-growers clean up the old plantations so thoroughly by fire, and by doing so destroy large quantities of the bagworm fungus, it would, I am sure, be a more efficient factor in eliminating the bagworm than it is at present.

#### BACTERIAL DISEASES OF THE BAGWORM.

It has been observed by officers of this Division and of the Division of Entomology, and by wattle-growers themselves, that the bagworms which infected whole plantations have been decimated by what apparently can only be ascribed to some bacterial infection. Several bacteria have been isolated from the dead worms but did not prove pathogenic in infection experiments which were made.

#### CARNATION WILT.

For some years past, carnation growers have complained of a disease in their plants which causes them to suddenly wilt off and die. The trouble has become so bad in Natal that nurserymen have almost been compelled to abandon what was at one time a most profitable business. Mr. Van der Byl has been giving attention to this matter and finds that the disease is caused by a fungus belonging to the genus *Fusarium*, and which is essentially a soil organism. A detailed study of this disease is being undertaken with the object of testing the influence of various soil fungicides and chemicals on the fungus in the hope of finding a substance which when added to infected soil will inhibit its further growth. Here again, the work is considerably hampered through lack of the necessary facilities in the shape of greenhouse accommodation for conducting the experiments.

#### PINE DISEASES (*Diplodia pinea* (KICKZ)).

One of the most important fungus diseases dealt with during the year is that caused by *Diplodia pinea* (Kickz).

For some years past the Department of Forests have complained of various species of *Pinus* dying off in the plantations in the Eastern Province of the Cape, and there is now little doubt but that much of it is due to the fungus *Diplodia pinea*, and from the specimens submitted by the Chief Conservator of Forests I have no hesitation in stating that it will be mere waste of money to continue planting large areas of such pines as *Pinus halepensis*, *P. Thunbergii* and *P. sabiniana* in

the eastern parts of the Cape Province. Up to the present *Diplodia pinea* has been observed on

*Pinus canariensis*,  
*P. halepensis*,  
*P. insignis*,  
*P. palustris*,  
*P. pinaster*,  
*P. sabiniana*.  
*P. Thunbergii*.

In all these cases full-grown trees had been attacked and killed.

Even more serious than this is the fact that the fungus has appeared amongst nursery stock and killed off large numbers of seedling trees when not more than 4 to 6 inches high at the Evelyn Valley Nursery in the Eastern Province.

This fungus is not regarded as a serious parasite in Europe, where it is endemic, and this is only one of many instances which goes to prove that it is not safe to assume that a parasite which is of little or no economic importance in another country will not, under South African conditions, prove a serious parasite when introduced here. Some safe basis for predicting what the behaviour of such parasites will be when introduced into South Africa is greatly needed, and this could be done by making careful inoculation experiments with such fungi in this country under carefully controlled conditions, so that there would be no danger of their spreading.

In the case of *Diplodia pinea*, it is highly important that this Division should be able to furnish accurate and reliable data to the Forestry Department regarding the susceptibility or otherwise of all known species of *Pinus* to this parasite. As I have pointed out already, we are unable to carry out this work owing to the absence of any greenhouse or infection house facilities.

*Diplodia pinea* is widely distributed through the Cape Province, Orange Free State and Natal. Up to the present no *Diplodia* affected pines have been observed in the Transvaal.

Although *Diplodia pinea* is likely to cause most damage in those plantations which are injured by hail, gnawing animals, insects and such like, I have shown conclusively that it is also able to attack uninjured trees.

#### DRY-ROT OF MAIZE (*Diplodia maydis*) (BK.) SACC.

This trouble is becoming more widely distributed every year, and not only does it cause considerable loss to the crop, but infected cobs are reported to be extremely poisonous to stock. A detailed study of the fungus has been undertaken in the laboratory by Mr. Van der Byl with the object of preventing the spread of the pest and also to throw some light on its poisonous properties.

The fungus has been grown on a large number of media with very successful results, and pure cultures have been obtained in sufficient quantity for carrying out definite feeding tests in conjunction with the Director of Veterinary Research. So far, infected maize from the field and pure cultures of the fungus have both given negative results in the feeding tests carried out.

It has been found that lime retards the growth of the fungus, and Mr. Van der Byl is now busy with a series of experiments having as their object the determination of the effect of various manurial elements and soil fungicides.

#### MAIZE WILT.

A serious root disease of maize has been under investigation. Mr. Van der Byl has isolated a *Fusarium* in connection with the trouble and obtained infections by inoculating soil with the fungus. The further study of the disease has been delayed owing to the difficulties involved in carrying on the work without any greenhouse facilities.

#### CEREAL RUSTS.

Miss Bottomley has commenced a study of the germination of the uredospores of *Puccinia graminis* Pers. with the object of finding out what substances, if any, inhibit the growth of the germ tubes, and subsequently might have a deleterious effect on the fungus without affecting the host plant.

[U.G. 2—'15.]



The absence of greenhouse accommodation has precluded any infection experiments being carried out, and has made investigations into the obscure life-history of these parasites most difficult and well nigh impossible.

#### MANGO BACTERIAL DISEASE

Miss Doidge's work on this subject has now advanced so far that a bulletin has been prepared and submitted for publication. Miss Doidge has briefly summarised her work carried out on this organism during the year as follows:—

- "(1) The cultural characters were carefully studied on a number of media.
- "(2) The action of light heat and dessication on the bacillus was tested, also its ability to grow in the presence of certain gases and a number of germicides not previously used.
- "(3) The experiments in connection with its chemical relations were repeated and the results verified.
- "(4) A number of infection experiments were carried out, but with only slight success, as it is almost impossible to infect plants in the open in dry weather such as we have experienced lately. This phase of the work cannot be satisfactorily done until greenhouse accommodation is provided."

#### PEPPER TREE (*Schinus molle*) DISEASE.

Nurserymen in Natal and the Cape have for some time past experienced considerable difficulty in raising young pepper trees (*Schinus molle*), especially in wet seasons.

Young trees from 12 to 18 inches high are very subject to a disease which first appears in the form of black spots on the stems, and then almost immediately afterwards the leaves become spotted and soon wither and dry up. As a rule, in the second season of growth, as soon as the stems become woody, the trees are not so liable to attack.

The disease has been investigated by Miss Bottomley, B.A., who finds that the causal organism is an undescribed species of *Collectotrichum*, and the disease does not appear to have been recorded before from any other part of the world.

The fungus has been obtained in pure cultures, and a number of inoculation experiments carried out. Inoculated trees were completely destroyed by the fungus in from 6 to 7 days after inoculation.

As a result of these experiments, Miss Bottomley found that the disease could be readily checked by the application of Bordeaux mixture. Recommendations regarding the treatment of the trouble were accordingly made to nurserymen who had suffered on account of this trouble, and a grower in Natal has reported most enthusiastically regarding the results of the treatment given. He stated that whereas for years past he had only succeeded in raising a very few trees out of several hundreds, this year, as a result of spraying, barely a dozen were lost out of 600 trees.

#### POTATO DISEASE.

Miss Doidge, M.A., F.L.S., has commenced a study of the potato diseases prevalent in the country, and has begun a series of popular articles on the subject for insertion in the *Agricultural Journal*.

##### *Black Heart in Potatoes.*

Potatoes, especially those of the Up-to-Date variety, which arrive in this country from Europe and oversea, frequently when cut open exhibit a black discolouration inside. The affected tissue is also commonly fissured, and the general appearance of the tuber suggests a bacterial infection due to *Bacillus phytophthorus*. This condition is known as "Black Heart" in potatoes, and it has recently been stated by E. T. Bartholomew\* that this trouble is a physiological one caused by overheating after removal from cold storage.

In view of its frequent occurrence in the large shipments of potatoes made to this country it seemed advisable to test the truth of this statement, and Miss Doidge accordingly carried out the following experiments:—

"*Experiment No. 1.*—Twenty-four potatoes were put in an ice incubator for one week, then half of them were transferred to an incubator at 40° C. After 48 hours the tubers were cut open; there was no discolouration in either lot.

\* *Phytopathology*, Vol. 3, No. 3, p. 180.

"*Experiment No. 2.*—Thirty potatoes were put in an ice incubator for 48 hours; eighteen of them were transferred to an incubator at 40° C., the remainder acting as controls. After one week the potatoes were cut open. Seven tubers showed symptoms typical of "Black Heart"; in some of these the discolouration was only slight until the cut surface had been exposed to the air for a few minutes, it then rapidly turned a red-brown and finally black. Five more of the tubers showed slight indications of the trouble and the remaining six showed it not at all. The controls were all perfectly sound.

"*Experiment No. 3 (a).*—Fifty tubers of Early Rose seed potatoes were put in an ice incubator, and after 48 hours thirty-six of these were transferred to an incubator at 40° C., the rest being left as controls. (b) Thirty-six tubers were put in an incubator at 40° C. without previous chilling, and controls were put in an incubator at 25° C. After one week half the tubers of lots (a) and (b) were removed and cut open. In lot (a) there was no discolouration when first cut open, but after about 15 minutes' exposure to the air six tubers showed discoloured areas in the centre. In lot (b) only one developed a discoloured spot.

The remainder were cut open after two weeks, when only one of lot (a) showed "Black Heart" and of lot (b) only one when first cut open, but five more after exposure to the air. The controls were all sound.

"*Experiment No. 4.*—The following is a summary of the result of the experiment started on the 25th February. The tubers were kept for three weeks at a temperature of 40° C.

Variety.	Total No. of tubers.	No. of tubers with black heart discolouration.	No. of tubers also showing cracking.	No. of tubers destroyed by <i>Fusarium</i> and bacteria.
Early Rose .. ..	25	10	5	4
Up-to-Date .. ..	100	70	7	3
White King .. ..	100	18	4	65
Flour-ball .. ..	50	14	3	10

"The controls were all sound except a small percentage, which were attacked with the fungus *Fusarium*."

These experiments show clearly that the condition known as "Black Heart" can be produced artificially by exposing the tubers to an abnormal temperature such as they would be very likely to encounter in the sea voyage through the tropics.

#### FUMIGATION EXPERIMENTS.

As several complaints were made regarding the injurious effects of fumigation on the tubers at the ports of entry, an experiment was undertaken to ascertain whether there was any truth in these statements or not. The complaints had reference to potatoes which had undergone fumigation by formaldehyde gas, and as a result it was claimed that no germination took place. The usual period of exposure to the gas at the ports of entry is from 4 to 16 hours.

In the experiment conducted at the laboratory oversea seed potatoes were exposed to the usual dose of gas for 4, 8, 12, 16, 20 and 24 hours. A single box was exposed for each of the above periods and six boxes were kept as controls.

On planting out, the fumigated potatoes gave a total yield of 737 lbs., while the controls gave a total yield of 754 lbs.

#### PUBLICATIONS.

The following publications have been issued by the Division during the year:—

By Joseph Burt-Davy, F.L.S.

1. The Preservation and Use of Maize for Stock Feed: *Agricultural Journal*, Union of South Africa, Vol. V., 1913, pp. 585 and 739.

2. Botanical Notes, *Agricultural Journal*, Union of South Africa, Vol. VI., 1913, p. 66.

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By I. B. Pole Evans, M.A., B.Sc., F.L.S.

1. Dikvoet, Club-root or Finger and Toe in South Africa: *Agricultural Journal*, Union of South Africa, Vol. VI., 1913, p. 93.
2. Plant Diseases in South Africa: *Agricultural Journal*, Union of South Africa, Vol. VI., 1913, p. 449.

By P. A. van der Byl, M.A.

1. The Nature of Fungi, with reference to the Life Histories of some Important Parasites: *Agricultural Journal*, Union of South Africa, Vol. VI., 1913, p. 904.
2. The Anatomy of *Acacia mollissima* Wild., with special reference to the distribution of Tannin: Science Bulletin No. 3, Department of Agriculture, Union of South Africa.
3. A Study on a "Mottled Disease" of the Black Wattle: Science Bulletin No. 4, Department of Agriculture, Union of South Africa.

By Miss S. M. Stent.

1. Botanical Notes: *Agricultural Journal*, Union of South Africa, Vol. VI., 1913, pp. 66 and 961.

#### AGRICULTURAL SHOWS.

One or more officers of the Division attended all the principal Agricultural Shows in the Union during the period under review, and a useful and instructive exhibit, consisting of mounted specimens of noxious weeds and poisonous plants, Native and introduced pasture grasses, fruits that cause injury to animals, wool and hair, a representative collection of South African weed seeds both introduced and indigenous, and plant diseases, was staged at all these Shows.



## APPENDIX VI.

## DIVISION OF TOBACCO AND COTTON.

ANNUAL REPORT, 1913-14.

The Secretary for Agriculture.

Pretoria.

Sir,—

I have the honour to submit my report on the work of the Tobacco and Cotton Division of the Union Department of Agriculture, for the period April 1st, 1913, to March 31st, 1914.

## ADMINISTRATION.

*Correspondence.*—During the period under review 7,585 letters and telegrams were received and despatched. A large percentage of these were from farmers making inquiry for tobacco and cotton seed, when to sow, how to handle these crops, and how to dispose of them. Our stock of bulletins pertaining to these subjects are proving of great assistance in answering this class of correspondence. Instead of having to write long letters explaining in detail the proper procedure, we send bulletins which give the required information.

*General Clerical Work.*—Apart from correspondence, the keeping of returns, checking of accounts, stock-taking, purchasing equipment and writing bulletins and reports take a great deal of time. Unfortunately, the office work has suffered seriously on account of the Chief Clerk having been seconded to take charge of the Government exhibit at the Agricultural Shows.

*Publications.*—Besides a number of articles published in the *Agricultural Journal*, the following bulletins were issued:—

- (1) "The production of bright tobacco by the flue and air-curing processes."
- (2) "The production of cigar wrapper tobacco."
- (3) "Turkish tobacco in the Cape Province."
- (4) "Crop rotation in connection with tobacco and cotton and the use of fertilizers."
- (5) "Tobacco warehouse management."
- (6) "Cotton, from the lint to the manufactured article."

*Staff.*—The staff changes during the year have been as follows:—

In addition to his present duties as Officer-in-Charge of the Rustenburg Experiment Station, Mr. H. W. Taylor was appointed Assistant Chief of the Division.

It was decided to close down the Barberton Station at the end of the fiscal year, and in anticipation of this Mr. W. B. Wilson, the Officer-in-Charge, was transferred to Durban as Tobacco and Cotton Itinerant Instructor for Natal.

Mr. L. M. Stella, Itinerant Instructor in the Western Province, C.C., has been placed in charge of the Turkish Tobacco Experiment Station at Elsenburg.

Mr. J. du P. Oosthuizen has been appointed Itinerant Instructor for the Orange Free State.

Mr. P. Koch has been appointed Itinerant Instructor in the Eastern Province, C.C.

The cotton plots at East London have been closed down, and Mr. D. D. Brown, the Officer-in-Charge, has been transferred to Rustenburg Station as Foreman, *vice* Mr. C. A. Pereira, resigned.

Mr. T. E. Elgin, Tobacco Warehouse Expert, has been transferred from Rustenburg to Vredefort to assist in the establishment of a Co-operative Warehouse at that place.

The present staff of the Division is as follows:—

Chief, W. H. Scherffius; Assistant Chief, H. W. Taylor; First Grade [U.G. 2—'15.]

Clerk, T. A. J. Place; Clerk, J. de Ridder; Assistant for Fermenting Experiments, G. van Belkum; Typist, Miss Z. M. Welsford.

Officers-in-Charge of Experiment Stations: H. W. Taylor, Rustenburg; J. D. Bosch, Barberton (Acting); E. H. T. Powell, Tzaneen; R. T. Falgate, Piet Retief; L. M. Stella, Elsenburg; Warehouse Expert, T. E. Elgin, Vredefort, O.F.S.

Itinerant Officers, W. B. Wilson, Durban, Natal; J. du P. Oosthuizen, Vredefort, O.F.S.; P. Koch, East London, C.P.

#### FERMENTING WAREHOUSE.

The work in this branch has been:—

The fermenting of cigar wrapper tobacco and cigar filler tobacco, produced in the variety test plots at the Barberton Station, and the fermenting of cigar tobacco produced by farmers under our supervision. Grading, baling and disposing of the tobacco produced at all the Stations, and the storing and disposing of cotton produced at the Stations and also that grown by farmers working under our supervision; the preparation of exhibits for Agricultural Show purposes, for permanent exhibits here in South Africa, and for permanent exhibits oversea. The cleaning and grading of our own tobacco seed and that sent in by farmers have been attended to by the Officer-in-Charge of fermenting experiments.

#### STUDENTS.

During the year we have had 13 students at the different Stations. On the whole their work has been satisfactory. Some of them have completed their year's training and have started farming operations on their own account. The students are paid 3/- per working day, and provided with furnished quarters. At present a new Students' Hostel, to accommodate twelve students, is being constructed at the Rustenburg Station. I propose to make Rustenburg the headquarters for such work.

#### AGRICULTURAL SHOWS.

This Division has had an exhibit on all the principal Shows, and a number of smaller ones. The first grade clerk of this Division had charge of the entire exhibit for the Agricultural Department, he therefore had to be in attendance at all the principal shows. This phase of the departmental work has so grown in magnitude and importance that I think the time is opportune to consider the appointment of a permanent official to attend to it. In future, I cannot consider releasing my clerk to do this work, as it has seriously interfered with the work of this Division.

#### TOBACCO WAREHOUSES.

The Tobacco Warehouse at Rustenburg handled and has in store a considerably larger quantity of tobacco than during the two previous years. On account of the dry season most of the tobacco was of inferior quality, consequently the market has been very dull, and as a result the Warehouse still has something like 2,000,000 pounds of leaf in stock. Last season a number of farmers in the Rustenburg District turned their attention to cotton growing with a fair measure of success. As a result a larger number will plant cotton again next year. This will no doubt aid materially in relieving the present situation.

The Turkish Tobacco Warehouse Company at Paarl, Cape Province, has something over 200,000 lbs. of Turkish leaf nicely baled and stored in their warehouse. This leaf is now ready for sale and will no doubt soon be on the market.

A Co-operative Society has been formed in Vredefort, O.F.S., and a plot of ground has been purchased upon which they propose to erect a warehouse.

#### GENERAL.

*Buildings.* During the year two new tobacco sheds were completed, and a Students' Hostel is in course of construction at the Rustenburg Station.

An office, foreman's quarters and mealie crib were erected at Piet Retief.

A tobacco shed was erected at the Elsenburg Station.

*Seed Distribution.*—There were approximately 956 parcels of tobacco seed and 198 parcels of cotton seed distributed to farmers during the year.

*Transport.*—The work of some of the officers of this Division, who have large areas to cover, would be considerably facilitated if they had motor transport.

*Visits.*—The chief of the Division made frequent visits to the various Stations under the control of this Division. A member of my staff has been in attendance at all the principal Shows in the country.

#### GOVERNMENT TOBACCO AND COTTON EXPERIMENT STATIONS.

This Division has at present five Experiment Stations, located at Rustenburg, Tzaneen, Piet Retief, Elsenburg and Barberton. (The Barberton Station is being closed down.) The objects of these Stations are:—

- (1) To determine which varieties of tobacco and cotton give the best results in different districts and on different kinds of soil.
- (2) To carry on fertilizer and crop rotation experiments.
- (3) To produce improved seed for distribution to farmers.
- (4) To demonstrate the use and methods of operating flue barns for curing tobacco; and to determine what kind of air-curing sheds are most profitable to use.
- (5) To show the most improved methods of producing cigar wrapper tobacco.
- (6) To demonstrate whether these crops can be profitably produced in South Africa.
- (7) To advise students in regard to the best methods of producing tobacco and cotton.
- (8) In connection with the experimental work we keep daily records of the temperature and rainfall at each Station.
- (9) In addition to the experiments conducted at the Stations some of the officers are devoting their whole time to itinerant work, while others are devoting only a part of their time to this line of work.

#### RUSTENBURG STATION.

*Correspondence.*—During the year the Officer-in-Charge received 734 letters and telegrams and despatched 720; in addition, the monthly returns, monthly reports and annual report.

*Visitors.*—From July 1st, the date on which a visitors' book was started, till the end of the fiscal year, there were 349 visitors registered. A great many more called at the Station but did not register.

*Cotton.*—The cotton crop for the previous year was harvested in May and June, 1913. On account of the severe drought the seed did not germinate until December, and consequently the crop was light. The best yield was made by "Black Rattler" with 312 lbs. of lint per acre. The lowest yield, 60 lbs. per acre, was made by "Pullnot." The average yield from 22 varieties was  $175\frac{1}{2}$  lbs. of lint per acre. The lint was disposed of f.o.r. Pretoria at 6d. per lb. These results were so encouraging, in the face of a severe drought, that hundreds of acres were planted to cotton by farmers in the district in 1913-14. Although figures are not yet obtainable, I am confident that the crop will approach 500,000 lbs. of seed cotton this year.

*Cotton Ginning Plant.*—The results of the cotton experiments for the past two or three years have given the cotton industry such an impetus that a cotton Co-operative Society has been formed in Rustenburg, and a modern ginning plant has been installed to gin the crops. With a favourable season next year in the Rustenburg District we may confidently expect a big increase in the yield of cotton.

*Tobacco.*—The tobacco work consisted of variety tests, flue and air curing, seed-bed experiments and seed selection. Although the season was very unfavourable, the yield in the variety tests was quite good. "Boyd 1265" stood first, giving 1,459 lbs. of leaf per acre, and "Hertzegovina" stood last in the list, giving 442 lbs. of leaf per acre. The average weight of leaf per acre, produced with 19 varieties, was 984 lbs. Of the varieties suitable for flue curing "Bullion" and "Yellow Pryor" gave the highest yields. These varieties produce a good percentage of yellow and light red leaf, a type which is always in demand on the market.



Of the varieties suitable for air-curing, "Joiner" and "Burley X Swazie" gave the best yields. "Joiner" appears to be the best variety for air-curing purposes we have yet tried. A high percentage of the leaf cures yellow or light red. "White Burley" gives splendid light red and red leaf of fine silky texture, but it is a very delicate variety and does not stand extreme heat too well.

*Seed-beds.*—An experiment was conducted to determine the correct amount of seed to sow on a given area. The best results were obtained by sowing 1 oz. of seed to 300 square yards of seed-bed. In this case the germination must have been perfect, and practically all of the plants grew well. Ordinarily three times this amount of seed is required for 100 square yards of seed-bed. A second experiment was tried to determine the suitability of ant-heap as a surface covering for seed-beds. The experiment showed that ant-heap was excellent for a surface covering, provided it was applied and the bed sterilized afterwards.

*Seed Selection.*—A large number of typical plants of the several varieties of tobacco were selected for seed and the seed-heads were bagged to prevent cross-pollination. From these plants, approximately 90 lbs. of seed were produced. Practically the whole of this seed was distributed to farmers.

*Fertilizer and Rotation Experiments.*—This was the fourth year of the fertilizer rotation experiments, thus completing the first period of rotation. The results have been published in the journal and in bulletin form.

*Weather.*—The climatic conditions were very unfavourable for crop production. The rainfall was the smallest yet recorded at this Station, and the heat was excessive. Dry hot winds prevailed from November to February. The first killing frost occurred on the 19th May, which is about two weeks earlier than it usually occurs.

The rainfall was as follows:—

Year.				Month.	No. of ins.	No. of days.
1913	..	..	..	April .. ..	1·41	5
"	..	..	..	May .. ..	0·00	1
"	..	..	..	June .. ..	—	—
"	..	..	..	July .. ..	0·07	1
"	..	..	..	August .. ..	1·00	3
"	..	..	..	September .. ..	0·13	4
"	..	..	..	October .. ..	2·62	15
"	..	..	..	November .. ..	1·17	10
"	..	..	..	December .. ..	2·72	12
1914	..	..	..	January .. ..	1·10	14
"	..	..	..	February .. ..	1·36	15
"	..	..	..	March .. ..	3·45	9
Total for the twelve months				.. ..	15·03 ins.	on 89 days.

#### BARBERTON STATION.

*Correspondence.*—During the year the Officer-in-Charge received 422 letters and telegrams and 551 were despatched, in addition the monthly returns, monthly reports and annual report.

*Cotton.*—A few farmers in the district have gone in for cotton cultivation and would have made a success of it had it not been for the heavy charges for railage, commission, ginning, etc. One farmer planted 15 acres and reaped 197 lbs. of lint per acre.

These difficulties can be overcome by local ginning plants being established to do the ginning. After which the lint can be shipped to the coast *via* Lourenco Marques instead of sending the seed cotton to East London to be ginned, as was done in this case.

*Tobacco.*—The tobacco work consisted of variety tests, seed-bed experiments, seed selection, and fermenting and testing cigar tobacco. The tobacco crop was the most successful one that was ever produced on the farm. The highest yield per acre, 1,360 lbs., was obtained from "Sterling," a light smoking tobacco. The lowest yield per acre was 750 lbs. from "Florida Cuban," a cigar filler variety.

The average yield per acre from nine varieties was 972 lbs. Of the cigar wrapper types, "Sumatra" gave the best yield, showing 1,033 lbs. per acre.

*Seed-beds.*—An experiment was conducted to determine the correct amount of seed to sow on a given area. The best results were obtained by sowing 1 oz. of seed to 100 square yards of seed-bed. A second experiment was tried to determine the suitability of ant-heap as surface covering for seed-beds. The experiment showed that ant-heap, spread over the surface to a depth of four inches, gave splendid results.

*Seed Selection.*—A large number of the best plants were selected for seed, and the seed-heads were bagged to prevent cross-pollination. This seed was distributed to farmers.

*Fertilizer and Rotation Experiments.*—This was the fourth year of these experiments, which completed the first period of the rotation. The results have been published in the Journal.

*Weather.*—The total rainfall for the twelve months was 27.18 inches, being distributed as follows:—

Year.				Month.	No. of Ins.	No. of Days.
1913	..	..	..	April .. ..	5.53	10
"	..	..	..	May .. ..	0.55	3
"	..	..	..	June .. ..	—	—
"	..	..	..	July .. ..	0.07	1
"	..	..	..	August .. ..	0.56	2
"	..	..	..	September .. ..	0.50	3
"	..	..	..	October .. ..	4.03	7
"	..	..	..	November .. ..	7.93	10
"	..	..	..	December .. ..	3.23	7
1914	..	..	..	January .. ..	0.78	3
"	..	..	..	February .. ..	2.08	7
"	..	..	..	March .. ..	1.92	6
Total for the twelve months				.. .. .	27.18 ins.	on 59 days.

During a heavy storm in April a certain amount of damage was done in the district.

In November  $2\frac{1}{2}$  inches of rain fell in  $1\frac{1}{2}$  hours, washing the land badly. Some hail also fell and a little damage was done to the growing crops.

#### TZANEEN ESTATE.

*Correspondence.*—During the year the Officer-in-Charge received and despatched 1,336 letters and telegrams, in addition the monthly returns, monthly reports and annual report.

*Cotton.*—A four acre plot of cotton, under irrigation, gave excellent results, yielding 372 lbs. of lint per acre. Owing to the severe drought, which lasted until December, the 1913 crop was not planted till late, and consequently the yield was light. The total yield of lint was 3,050 lbs.

*Tobacco.*—The tobacco work consisted of variety tests, seed-bed experiments, seed selection, and nicotine experiments. Although the season was very bad, 8,850 lbs. of tobacco were produced. With eight or ten varieties "Yellow Pryor" gave the best results. This variety is the most universally grown of any in the District.

*Seed-Beds.*—An experiment was conducted to determine the suitability of ant-heap as a surface covering for seed beds. The results indicated that ant-heap has a certain manural value, as the beds covered with ant-heap were far ahead of the check beds. A second experiment was conducted to determine the correct amount of seed to sow on a given area. One ounce to 200 square yards gave the best results. In this case the germination of the seed and the growth of the plants was good. As a rule, twice this amount of seed is required for a given area.

*Seed Selection.*—A large number of typical plants were selected to produce seed. These plants were bagged to prevent cross-pollination. Approximately 50 lbs. of seed were produced and are being used to fill orders from farmers.

*Nicotine Experiments.*—The object of this experiment was to determine whether tobacco grown with a maximum amount of moisture would give a higher or lower percentage of nicotine than tobacco grown with a smaller amount of moisture. The result of this experiment will be recorded when the analyses have been made.

*Fertilizer and Rotation Experiments.*—This was the fourth year of these experiments, which completed the first period of the rotation. The results have been published in the *Agricultural Journal*.

*Horticulture.*—The new orchard has been kept in good condition, and had it not been for the severe hailstorm in December there would have been a good crop of fruit. As it was, all of the mangoes were destroyed and the citrus fruits were considerably battered. The old orchards were not given the same attention; only the weeds were kept down.

*Botany.*—The work under this branch consisted in variety tests of 20 odd varieties of mealies. "Iowa Silver Mine" gave the heaviest yield, showing thirteen bags per acre. "Will Gehu" gave the smallest yield, showing less than one bag per acre.

*Leguminous Crops.*—Quarter acre plots of cow peas, soya beans and velvet beans were tried.

Imported cow peas gave 1,120 lbs. of seed per acre.

Local graded soya beans gave 212 lbs. of seed per acre.

Local graded velvet beans gave 2,600 lbs. of seed per acre.

*Weather.*—The weather conditions were very unfavourable for crop production. The rainfall, compared with previous years, was small, and the heat was very trying.

The temperature and rainfall were as follows:—

Year.				Month.	No. of Ins.	No. of Days.
1913	..	..	..	April .. ..	4.74	14
"	..	..	..	May .. ..	1.10	5
"	..	..	..	June .. ..	0.10	1
"	..	..	..	July .. ..	0.20	1
"	..	..	..	August .. ..	0.06	1
"	..	..	..	September .. ..	0.86	5
"	..	..	..	October .. ..	2.70	8
"	..	..	..	November .. ..	3.79	12
"	..	..	..	December .. ..	2.72	10
1914	..	..	..	January .. ..	4.26	11
"	..	..	..	February .. ..	10.13	13
"	..	..	..	March .. ..	3.00	10
Total for twelve months				.. .. .	33.48 ins.	on 91 days.

#### PIET RETIEF STATION.

*Correspondence.*—During the year the Officer-in-Charge received 665 letters and despatched 602; in addition the monthly returns, monthly reports and annual report.

*Tobacco.*—The tobacco work consisted of field trials with a number of varieties. Severe hailstorms, in a measure, destroyed the usefulness of this experiment. The variety, "Clarksville Heavy," stood the severe tests best of all.

*Seed Selection.*—The best plants in each variety were chosen and the seed heads bagged to produce pure seed, which was issued to farmers.

*Cotton.*—The last two years we have tried cotton, but each year the crop has been destroyed by hail. If we could escape the hailstorms the indications are that cotton would grow successfully in this District.

*Fertilizer and Crop Rotation Experiments.*—This completed the fourth year of the rotation experiments. The results have been published in the *Agricultural*



*Journal.* Similar experiments are being conducted on three farms in the District; when the first period of rotation is complete the results will be published.

*Weather.*—Drought prevailed in the beginning, and later hailstorms did immense damage.

The rainfall was as follows:—

Year.					Month.				No. of Inches.
1913	..	..	..	..	April	..	..	..	2·27
"	..	..	..	..	May	..	..	..	0·39
"	..	..	..	..	June	..	..	..	0·13
"	..	..	..	..	July	..	..	..	—
"	..	..	..	..	August	..	..	..	0·79
"	..	..	..	..	September	..	..	..	1·47
"	..	..	..	..	October	..	..	..	4·31
"	..	..	..	..	November	..	..	..	2·61
"	..	..	..	..	December	..	..	..	3·56
1914	..	..	..	..	January	..	..	..	4·46
"	..	..	..	..	February	..	..	..	6·94
"	..	..	..	..	March	..	..	..	3·26
Total for twelve months ..					..	..	..	..	31·19 inches

#### TURKISH TOBACCO WORK.

*Correspondence.*—During the year the Officer-in-Charge received and despatched 1,080 letters, post cards and telegrams; in addition the monthly reports, monthly returns and annual reports.

*Itinerary.*—Although money was voted for the establishment of a Turkish Tobacco Station at Elsenburg, and the development work is progressing satisfactorily; the Officer-in-Charge has devoted most of his time to itinerant work. During the year he made some 350 official visits to farmers, public meetings, and to the warehouse, to give advice in the culture and handling of the tobacco crop.

*Variety Tests.*—Three varieties of Turkish tobacco, "Malcadji," "Baladovasi" and "Dubeck," were planted at the Elsenburg Station. These came on well and the crop is very good. The 1913 Turkish tobacco crop for the district amounts to approximately 210,000 lbs.

During the year 16 farmers were growing Turkish tobacco under the supervision of the Tobacco Expert.

#### TOBACCO WAREHOUSE EXPERT.

*Correspondence.*—During the year the Officer-in-Charge received 287 letters and despatched 370, in addition to many notices, monthly reports and the annual report.

*Itinerary.*—The Warehouse Expert has found it necessary to do a considerable amount of travelling in order to create an interest in the co-operative scheme in the Vredefort District, and to advise farmers as to the best methods of preparing their tobacco for market. During the early part of the year, while he was stationed at Rustenburg, travelling was not necessary, as most of the farmers could be seen at the warehouse there.

*Weather.*—The year has been the driest and the worst from an agricultural view that the people of the district have yet known.

#### ITINERANT OFFICERS.

Itinerant officers were appointed for the Orange Free State and the Eastern Section of Cape Province last December. An itinerant officer was also transferred to Natal. By this new arrangement the officers of the Division are fairly evenly distributed throughout the Union.

[U.G. 2—'15.]

Their work consists in answering correspondence, attending and lecturing at farmers' meetings, visiting farmers to give advice *re* tobacco and cotton culture, conducting co-operative experiments with farmers and giving lectures at the Agricultural Schools.

RETURN OF THE TOBACCO IMPORTS AND EXPORTS OF THE UNION DURING THE YEAR ENDED DECEMBER 31ST, 1913.

IMPORTS.

			£	s.	d.
Unmanufactured Tobacco .. ..	1,033,910 lbs.	50,358	0	0	
Manufactured Tobacco .. ..	55,026 "	5,737	0	0	
Cigars .. ..	111,815 "	49,923	0	0	
Cigarettes .. ..	311,635 "	84,656	0	0	
Total .. ..	1,512,386 lbs.	£190,674	0	0	

EXPORTS.

		£	s.	d.
Unmanufactured Tobacco .. ..	117,066 lbs.	3,512	0	0
Manufactured Tobacco .. ..	123,483 "	11,216	0	0
Cigars .. ..	175 "	50	0	0
Cigarettes .. ..	3,510 "	801	0	0
Total .. ..	244,234 lbs.	£15,579	0	0

FINANCE.

	Amount of Grant.	Expenditure.	Excess.	Saving.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Rustenburg .. ..	1,120 0 0	1,091 4 1	—	28 15 11
Barberton .. ..	750 0 0	794 7 3	44 7 3	—
Piet Retief .. ..	750 0 0	884 15 6	134 15 6	—
Tzaneen .. ..	1,800 0 0	1,533 9 10	—	266 10 2
East London .. ..	350 0 0	166 1 7	—	183 18 5
Orange Free State ..	750 0 0	38 10 0	—	711 10 0
Natal .. ..	750 0 0	0 5 6	—	749 14 6
Elsenburg .. ..	750 0 0	557 15 2	—	192 4 10

The following table shows the approximate amounts expended at each Experiment Station on permanent improvements, the purchase of animals, implements and the like, as distinct from the current expenditure.

	Permanent.	Current.	Total.
	£ s. d.	£ s. d.	£ s. d.
Rustenburg .. ..	250 0 0	841 4 1	1,091 4 1
Barberton .. ..	160 0 0	634 7 3	794 7 3
Piet Retief .. ..	105 0 0	779 15 6	884 15 6
Tzaneen .. ..	100 0 0	1,433 9 10	1,533 9 10
East London .. ..	—	166 1 7	166 1 7
Orange Free State ..	—	38 10 0	38 10 0
Natal .. ..	—	0 5 6	0 5 6
Elsenburg .. ..	390 0 0	167 15 2	557 15 2

*Revenue.*---The revenue returned during the period under review amounted to £1,337 8s. 4d., made up as follows:—

## REVENUE.

Rustenburg	...	...	...	£475	9	6
Barberton	...	...	...	91	4	4
Piet Retief	...	...	...	119	11	9
Tzaneen	...	...	...	632	4	9
Stellenbosch	...	...	...	18	18	9
				<hr/>		
				£1,337 8 4		
				<hr/>		

I have the honour to be,

Sir,

Your obedient servant,

W. H. SCHERFFIUS,

Chief, Tobacco and Cotton Division.





## APPENDIX VII.

## DIVISION OF HORTICULTURE.

ANNUAL REPORT, 1913-14.

The Secretary for Agriculture.

I beg to hand you the following report on the work of the Horticultural Division during the abovenamed period, together with reports from the Government Fruit Inspector, Cape Town, and the Horticulturist, Warm Baths, which I am anxious should appear herewith.

*Staff.*— During the year no change has taken place in the technical staff immediately under my control. It now comprises:—

- 1 Horticulturist at Warm Baths (Citrus Station).
- 1 Fruit Inspector at Cape Town.
- 1 Itinerant Horticulturist, E.P. Cape, appointed 1st April, 1914.

*College Staffs.*

- 1 Horticulturist and 1 Assistant Horticulturist at Elsenburg, Cape.
- 1 Horticulturist and 1 Assistant Horticulturist at Potchefstroom, Transvaal.
- 1 Horticulturist at Cedara, Natal.
- 1 Horticulturist at Middelburg, C.P.
- 1 Horticulturist at Glen, O.F.S.

In addition to the above, assistance has been rendered by the Plant Inspectors attached to the Division of Entomology at the ports of Durban and Port Elizabeth. The duties of these officers have been in connection with the export of fruit, and consisted chiefly in inspection work.

## ACTIVITIES OF THE DIVISION.

The Horticulturist at Warm Baths has been absent on leave for six months, but during his absence the place was well looked after, and more than ever justifies its existence. Continual testing of varieties has been undertaken, and this has proved most valuable in that the climatic conditions of the Waterberg District represent very fully a further vast area to which the results there obtained are applicable.

Out of some 1,400 citrus trees of all ages on every kind of root, one does not expect to be able to put up records as to profits obtainable per acre. Experimental Stations are not instituted with any such object in view. Were that the case, operations would be undertaken on an entirely different scale, and instead of planting every known variety of citrus tree in fives or tens of a kind, for the purpose of testing their suitability for our South African conditions, some two varieties would be planted, and it is extremely probable that with the care and management available new records as to profits would then be set up: local farmers would of course complain, and justly, that Government was competing with them. Experimental orchards do not exist for the immediate object of making money, but rather that work may be undertaken which for the private grower would be difficult, if not impossible, owing to lack of scientific training, also for the dissemination of the knowledge obtained from such work, the distribution of cuttings of successful varieties, and as an object-lesson generally.

I regret that a recapitulation of these facts should be necessary.

The Experimental Station at Ermelo was closed on the last day of the financial year, the services of the Horticulturist in charge being transferred to the Eastern Province of the Cape, where he will act as Itinerant Instructor. This Station has proven a considerable factor in influencing the planting of apples in the Eastern Transvaal high veld, and many thousands of trees are now standing in the Districts named of those kinds which proved most suitable at Ermelo.

[U.G. 2—'15.]

The Government Fruit Inspector (Cape Town) has had his time fully occupied throughout the year, in fact has often had more to do than he could manage. The development of the citrus export trade makes continual calls for instruction, and not only demands all the time he can possibly spare, but that of the Assistant Horticulturist at Elsenburg, in addition to my own, when available.

As regards my own work, this has lately been of an unsatisfactory nature. The constant demands for my services in different parts of the country to act in various capacities has entailed an amount of travelling which has been excessive, and I shall be compelled, in justice to myself and the Division, to considerably curtail my journeys in future. I have, perforce, had to neglect such matters as bulletins, articles for the *Journal*, etc., and I propose to endeavour to make up for that as far as possible during the coming year. There are many subjects demanding prompt attention.

A Conference of Horticulturists was held in Pretoria last August, and the lines laid down as affecting Horticulturists at the Colleges and their relations between their Principals, to whom they are immediately responsible, and the technical Head of their Division. There is every reason to believe that harmonious working will result. In addition, it was decided to take up certain branches of work in connection with bitter pit in apples, raising all kinds of stock for fruit trees locally, especially blight proof apples and pears stocks, and the investigation of citrus stocks most suitable for the coastal districts.

Sufficient time has not yet elapsed for any definite results to appear, but in each case matters are well in hand. In addition, arrangements were made to admit of an article on fruit growing in some one of its many branches to appear in the *Union Agricultural Journal* each month.

#### FRUIT EXPORT.

As I anticipated last year, the reduction in freight, in conjunction with a record crop of deciduous fruits, is responsible for the largest export season yet experienced in South Africa. All previous exports of deciduous fruits are left far behind, as the following figures show:—

Highest previous number of tons exported in the season for 1911-1912, from Cape Town, was 4,096.

Last season's export, November 29th, 1913, to May 9th, 1914, from Cape Town, was 6,460.

This was satisfactory business as a whole, and includes:—

Pears	...	...	...	...	163,030	packages
Grapes	...	...	...	...	125,210	„
Plums	...	...	...	...	85,708	„
Peaches	...	...	...	...	59,646	„
Nectarines	...	...	...	...	9,033	„

besides smaller quantities of other fruits.

These figures do not include some 247 tons of pears and melons, carried in ventilated holds or on deck, neither do they embrace citrus fruits, export of which amounted to some 40,000 boxes, and is spread over those months during which deciduous fruits are dormant, *i.e.*, from May until October.

In the Trades Commissioner's admirable report for the year ending December 31st, 1913, he gives lists of the average prices received for all varieties of fruits per box, together with an approximate estimate of exporting a single box of each kind. It is therefore unnecessary for me to recapitulate his remarks.

I would like to point out, however, that it is only a question of a comparatively short time before South Africa will be known principally as a citrus and pine-exporting country. A profitable business will, of course, still be done in deciduous fruits, but the citrus family, and especially the orange, is the fruit of the future.

#### FRUIT EXPORT REGULATIONS.

As you are aware, no steps are taken towards drawing up new, or altering old, regulations without first consulting the principal exporters. Last October and November meetings of exporters were held in Cape Town, Grahamstown and Durban. The regulations decided upon at these meetings took final shape.



and were published under Government Notice 1723 of November last. These were not, however, all that could be desired. Although the Union Castle Steamship Company, in order to encourage the export of fruit of good quality and up to a certain standard, had made certain concessions in freight in favour of such fruit when passed by the Government Inspector, and had, in a negative way, penalised exporters of fruit of a lower class, it was felt that in order to make the Government inspection of fruit really effective it should be made compulsory by law. With this end in view an Act was drawn up somewhat on the lines of a previous one submitted to the Cape of Good Hope Parliament in 1909, and placed before Parliament by the Minister of Agriculture. I may say that at the date of writing it has been passed, and, though not quite in the original form, it cannot fail to have a beneficial effect upon the industry. It will also make the promulgation of new regulations necessary, and indirectly, open up the ports of East London and Mossel Bay as ports of export. Further, although fruit of any variety and size may be sent away, provided that it is in sound condition, it is to be supposed that eventually the more speculative dealers will have decided upon which varieties pay and which do not pay to ship, and that finality will eventually be arrived at in a list similar to those previously in use. The shipment of fruit sent away in an unripe condition at the commencement of the season will be rendered impossible. This is a great gain to growers, as shipments of this kind sent with the express object of "catching the early market," have done an incalculable amount of damage, not only in South Africa, but in other countries.

#### IMPORTS OF FRUIT, NUTS, ETC.

The following is a complete list of the imports of fruits, nuts, jams, canned and dried fruits imported into the Union of South Africa during

	1913.		1912.	
	lbs.	Value.	lbs.	Value.
		£		£
Almonds .. .. .	229,551	14,416	233,968	13,052
Currants and Raisins .. ..	1,639,037	23,926	1,808,552	28,717
Dates.. .. .	3,110,638	23,772	2,478,123	17,943
Prunes .. .. .	428,725	7,739	9,471	276
Other Dried Fruits .. ..	478,311	17,190	408,001	10,074
Walnuts .. .. .	27,544	661	19,930	557
Other Kinds of Nuts .. ..	354,483	9,875	364,045	7,786
Canned and Bottled Fruits ..	1,085,207	20,629	738,540	15,128
Pulp .. .. .	166,935	1,915	56,053	942
Fruit Juices and Cordials ..	—	17,756	—	19,552
Fresh Fruits .. .. .	—	28,633	—	23,174
	—	£166,512	—	£137,201

The increase of 1913 imports over 1912 is noticeable. It is due to various causes; the import of prunes being due to the almost total failure of the Western Province crop, and the same may be said with regard to dried fruits of other kinds. Fluctuations of this kind are always to be looked for, and occur in other countries to a greater or lesser extent annually. The increase in the imports of canned fruits is serious, and indicates the need for expansion on the part of our canneries.

"Fresh fruit" increase is due to the larger quantity of apples imported, and really marks the increased spending powers of the public because our own supply of this fruit is making good headway.

Most satisfactory is the lessened amount spent on raisins, as this marks the commencement of the development now going on in the Western Province of the Cape. The fact remains, however, that the huge sum of going on for £17,000 was spent by the Union last year for fruit and fruit products, fully 75 per cent. of which should have been produced within the Union.

## FRUIT PRODUCTION OF THE CAPE.

By far the most important branch of fruit culture at present is that which has the export of deciduous fruits as its object. Its operations are chiefly confined to the districts of Worcester, Paarl, Stellenbosch and Constantia, and the kinds of fruit produced are all to a greater or lesser extent selected with a view to their acceptability on the European market. Taking them in order of importance we find, apart from the grape,

Pears, plums, peaches, nectarines, apricots and melons as being the fruit principally grown.

The export business is doing well in the Western Province. There are, of course, weak spots such as wasty arrivals of grapes. This is one of the most serious faults in an otherwise good record. Attention is drawn to the report of the Government Fruit Inspector at Cape Town.

## DRIED FRUITS.

The season just passed has been one of the best known in South Africa for dried fruits. Here again Western Province leads. Bodies of a more or less co-operative nature handle large quantities of prunes, peaches, pears and apricots at Wellington. This business is also well done and a good article turned out. Insufficient land is devoted to the business and certain drawbacks exist, especially in connection with the French prune. The trees are as a rule, not as healthy as they should be, due partly to many being planted on too poor soil, also to the use of not altogether suitable stocks. Growers cannot find soil too good for this fruit, nor yet too deep; they would be well advised not to attempt the culture of the prune unless they have soil suitable. The question of fertilization requires more attention than is paid to it.

The dried peach output is good this year, smaller in quantity but better in quality than the prunes. "Muir's" always dry out economically, and that perhaps accounts for so many being planted, but the dried "Muir" is not equal to the "Elberta," "Crawford" or "Foster," and some others of that type.

The pear dries well. It is well handled at the Cape, and some of the best might have been seen there last season. The "Bon Chretien" is nearly the only variety used for the purpose.

*The Apricot.*—As a dried article Cape apricots are superior to any other fruit produced there. The colour, quality and texture are all good, and the drying process is well understood. The high price of one shilling per lb. has been obtained in London for Cape dried apricots; there are few better put on any market. The dried fruit business, though altogether too confined in its area, is in a hopeful condition.

*Raisins and Currants.*—The enterprise of the Wellington driers affords the only bright spot in the outlook in this business. Two or three firms have gone out of their way to purchase and dry grapes, and the result has been that for the last couple of years or so a really good article has been placed on the market in the way of "pudding" raisin. "Clusters" have been almost entirely neglected, yet this style of raisin is, when nicely gotten up, a far more attractive line than the other, and one that realises better prices.

The lack of enterprise in the principal raisin-grape districts of the Cape is hard to understand. Reference has been made to the large sums spent annually by South Africa oversea for the purchase of this fruit, also to the good work done in Wellington. It would appear that the dried fruit men of that district have made a corner in energy.

*Canned Fruits.*—This business is in the hands of powerful companies, as far as the Western Province is concerned. It is also represented in the Eastern Province to a lesser extent: this is not to be wondered at, the supply of green fruits being smaller there than in the west. There are indications that, as in the export fruit business, standardisation of packages is necessary. Business is generally being extended, and the article produced, though "not bad," is not as good as it should be. Why should any "Californian Bartlett" pears be sold on our markets at all, when it is an acknowledged fact that South African "Bon Chretien" pears are not to be excelled in any single particular.

*Dates.*—Attention has recently been drawn by Sir Rider Haggard to the possibilities existing for the establishment of a date-growing industry in some parts of South Africa. It is admitted that possibilities do exist, and that in some parts of Namaqualand date-growing is beyond the experimental stage, in fact a small Government subsidy is given in one case for the necessary



attention to be paid to a few special palms. Up to the time of writing I have not been able to visit that part of South Africa, and can therefore state nothing beyond hearsay. From all accounts the palms grow and the fruit ripens satisfactorily, and as soon as circumstances will permit I propose visiting the District of Pella, near which spot more appears to have been done than elsewhere.

*Figs.*—The output of dried figs is small and not of a very satisfactory nature. The production of "Smyrna" figs has not been seriously undertaken so far. This is due to the fact possibly that it is only comparatively recently that the introduction of the "Blastophaga" has taken place, and that the true Smyrna fig of commerce has been obtainable. Just as in the case of the "French" prune, which is unequalled, so with the "Smyrna" fig it stands out superior to all others. It is for this reason that growers should aim at the production of this particular kind of dried fig as being likely to afford larger profits and a more constant demand than can be secured from any other. True Smyrna fig trees are to be had from most nurserymen, the necessary Capri figs and Fig Wasp from the Government School of Agriculture, Elsenburg.

*Pines.*—The pine apple business is now assuming a more healthy aspect than it has for some years past. In addition to home markets, the development of the oversea business has been satisfactory, for a beginning, and it is confidently expected that within a few years exports of this fruit will extend enormously.

The District of Lower Albany is, perhaps, unequalled in South Africa as a producer of both Cayenne and Queen pines. Colour, shape, quality and flavour are combined in each fruit, *i.e.*, when properly grown. There are a great many, unfortunately, which are not properly grown, but which look after themselves. Given the right man, who studies the requirements of the fruit, twenty acres of pine apples will afford him a competence. The yield is good, two crops per annum being secured under favourable conditions, and disease amongst the plants is practically unknown.

*Bananas.*—The quantity of these grown in the Cape Province is entirely negligible as far as the West is concerned. In the East it should be possible to produce a reasonably good fruit, more particularly so near Port St. Johns, but nothing to speak of has, so far, been accomplished.

*Citrus Fruits—Oranges*—The orange can be produced in many districts of the Cape, in some of these, near the coast, considerable success has attended the export of this fruit. An examination of the surrounding conditions will, in nearly all instances, reveal the fact that the coastal-grown oranges, which carry well, are produced at some 12 to 20 miles inland or have an intervening mountain range between them and the sea. The latter case is particularly well exemplified in the Long Kloof.

Some of the best oranges are grown in the neighbourhood of Fort Beaufort, and Mr. Roberts of that District has obtained an enviable position as one of the most successful growers, packers and shippers of really good fruit in the Union.

In the Oudtshoorn, George, Mossel Bay and other South-western Districts, good oranges can be grown; similar remarks apply to the Western Province whilst Clanwilliam and the surrounding districts are noted for the excellence of their products.

Planting is going on all over the Cape Province on a large scale, and with every prospect of continuing for some time to come.

Lemons are produced largely for home markets, though some few boxes are occasionally exported, and when they arrive in England during the months of July and August, remunerative prices may be realised. The immense quantity of Mediterranean lemons—supplied at prices with which we cannot compete—is sufficient to supply the English market during the remainder of the year.

*Naartjes.*—Both Mandarins and Tangerines are known by this name. Both grow well and command a fair local market. Exports consist chiefly of the latter, and what is known as "The plat skil Naartje" is amongst the best. The quantity shipped oversea is increasing.

#### CITRUS FRUIT EXPORT GENERALLY:

Reports from Fruit Inspectors at Cape Town and Port Elizabeth agree that growers are too careless in the way they handle oranges—little thought, if any, is given to the correct sizing of the fruits; many are plucked and not cut from the tree, leaving long stems on each orange—lots of fruit infested with red and other scale is offered for shipment, and a great deal of "puffy skinned" or "corky" fruit is packed. Of 5,169 boxes submitted for inspection at Port Elizabeth, some 270 were rejected as being unwrapped and others falsely marked.



It is impossible to expect to build up a sound trade in fruit on such practices as those. Fortunately there are many shippers who fully realise that unless a thing is done well it is best left alone, and it is these individuals who receive the very high prices for their fruit, which one occasionally sees quoted in the papers.

It may be of interest to note that the export of citrus fruits and pineapples has made considerable progress as will be seen from the following figures for the calendar years:—

			1912	1913
Oranges	...	...	£6,345	£11,530
Naartjes	...	...	£1,322	£2,217
Pineapples	...	...	£1,244	£1,687

*The Apple.*—The king of fruits has been left until last because practically no export of apples has hitherto taken place from South Africa. Occasionally a few boxes are sent away, possibly German South-West Africa being our best customer. Nothing, however, in the way of organised effort has been made in the way of export.

Within the next year or so this must be undertaken, because at certain seasons we shall be able to export with advantage. At the same time it ought to be remembered that we import apples from Canada, America, Australia and Tasmania. Arrivals from the latter countries appear on our markets when they ought to be well supplied with fruit of our own production. More attention is paid to the production of apples commercially in the Eastern than in the Western Province; the exhibit placed on the tables at the last Port Elizabeth Show was the best ever seen in South Africa. The Long Kloof, Humansdorp, George, Lower Albany and surrounding districts stand easily first as producers of good quality apples. What is more they can grow them profitably without risk of loss from hail-stones, which is a very great consideration.

#### FRUIT PRODUCTION IN THE TRANSVAAL.

The leading items enumerated under the heading of "The Cape," *i.e.*, Export of Deciduous, Dried, Canned, Raisins, Dates and Figs, can all be eliminated when considering the fruit output of the Transvaal; as an export factor they do not exist. The reasons for this are simple and not far to seek, so that it is useless going into the matter. One can say, however, that some of the best fruits in the way of peaches, pears, apples, etc., can be, and are, grown on the Transvaal high veld. Later on it may be possible to export the two last-named fruits to a limited extent, but they are an unreliable quantity. Neither is the drying of deciduous fruits, nor yet the canning industry, likely to make headway here. The reason for the former is that, owing to our rains falling in the summer that season of the year is rendered unsuitable for sun-drying, and evaporating is still too expensive. Economic surroundings alone compel the concentration of our canning industries near the coast, and this quite apart from the fact that the greatest supply of fruit is there obtainable.

*Pines and Bananas.*—Grow to perfection in many of the warmer districts, such as Barberton, Zoutpansburg, Marico, Waterberg and others. Here again economic considerations do not render it possible to raise either of these fruits profitably. Both are sent up from Natal in enormous quantities. Pines also from the Eastern Province, and sold at such prices as render their growth here uninteresting.

There remain the avocado and paw-paw for local consideration and consumption, and with these fruits we can do something. Both grow well in the districts already named, and are receiving a certain amount of attention. Last season successful attempts were made to export avocados, and these want to be followed up. The local demand for the paw-paw is a large one; so far little success has attended the export of this fruit.

*The Mango.*—The mango grows better in the Transvaal than it does in any other part of South Africa. The local demand for this fruit is good all over the Union and prices have been good enough to cause growers to think twice before packing them in a box with an export label on it. There are, however, one or two varieties which sell in Europe at such prices as will command their export as long as the fruit sent is up to the high standard required there. These are the "Peach" and the "Sabre," both most attractive looking fruits, the former being almost entirely free from disease of any kind and apparently immune from the "Black Spot" so called, which is prevalent in most countries where mangoes are grown.

The Barberton district at present produces the best mangoes in South Africa. At an altitude of 2,400 ft., with a climate occasionally tropical and an atmosphere not too heavily charged with moisture, the tree seems to thrive and the fruit to possess better carrying qualities than is the case when grown nearer sea-level.

*Citrus Fruits.*—With the exception of the grape fruit, the Transvaal produces the best citrus fruits of any Province in the Union, and in quantities that some time since called for an outlet other than the local market.

The growing of oranges in the Transvaal is really the only branch of export fruit growing worth much consideration. It is on a sound and expanding basis. Many thousands of trees of the best kinds have been planted during the past few years, and when they come into full bearing the output from this Province will be very large.

During the year under review marked improvements have been manifest in the manner in which the culture of the orchards has been conducted, and, although there is room, especially in certain districts, for further effort, it is a matter of congratulation to growers that such strides have been made.

Corresponding progress has been noticed in the handling of the orange crop for export; fewer complaints have reached this office from the inspectors with regard to wrapping and packing of fruit and general get-up of boxes, etc., than from any other Province.

Transvaal growers are to be congratulated on the big step forward they have made during the short period which has elapsed since the commencement of orange export; they are also urged to move forward and secure for their use the most up-to-date appliances for handling their crops, as such not only go far in cutting down the labour account, but, by ensuring perfection of detail in packing and appearance, the fruit, when exposed for sale, is seen at its best, and as a consequence receives the highest prices.

*The Lemon.*—No lemons have hitherto been exported from the Transvaal, for the reasons mentioned in connection with the Cape product of the same article. There is a large local demand which is only partly supplied by Transvaal growers. A good many trees have been planted within the last ten years; previous to that time—or say, pre-war days—the European varieties of lemons were practically unknown here.

*Naartjes.*—Very few of these have been exported. Local demand is always good and prices fairly remunerative.

*Grape Fruit.*—The total number of trees of this fruit in the Transvaal is very small. The quality of the fruit is excellent, and London agents have reported that as far as the flavour and texture is concerned it cannot be surpassed. Its appearance, however, is against it; this is presumably due to climatic influences and the surroundings found at the altitude at which the fruit is grown in the Transvaal. The very large, smooth silky-skinned, light yellow fruit which comes from Jamaica and Florida is grown in a moist climate and at a low altitude, and it is only reasonable to expect that greater success will attend the culture of grape fruit at some point or other on the coast than can be obtained in the Transvaal.

#### FRUIT PRODUCTION IN NATAL.

It may be said that Natal produces no deciduous fruits worth mentioning as compared with her citrus and tropical products in that line. The fact that during the year past plums and pears are to be found amongst the list of exports indicates that there are possibilities for the building up of a trade in these fruits. The advantage possessed is that all fruit grown in Natal is, owing to the character of the climate, earlier than that produced in the other exporting areas.

*Naartjes.*—This fruit is placed first on the list because it stands at the head of last year's exports, some 11,000 cases having been sent away. Further, it is at the present time the best of Natal's citrus products. The class of naartje most largely exported is of the Tangerine type and known generally in South Africa as "The Natal Naartje." It is undoubtedly the best naartje grown in the Union, and is produced to a large extent in the coastal districts north and south of Durban. Export of this fruit lies to a large extent in the hands of dealers, to the exclusion of the actual grower, and it is possibly due to the fact that the largest dealers and exporters are a most painstaking and progressive body of men that such an amount of success has attended naartje export from this Province.



*Oranges.*—Less than 1,500 boxes of oranges were sent away from Natal during the year. This is not an encouraging record, and is likely to prove the minimum mark in the history of this industry. The reason why this small quantity only should have gone forward is possibly to be found in the fact that coastal growers have in past years received little encouragement either in prices received or in the way their fruit stood transport. It has finally, apparently, been recognised that the export of coastal grown oranges is not a reliable business, and so far the up-country grown article has not been available for export in sufficient quantity.

With the development of citrus culture within a radius of a few miles of Maritzburg and in a few other suitable localities it is only a question of a year or two before Natal will take her place with her sister Provinces as an exporter of good, well-grown fruit. The higher uplands of Natal produce as good an article in the way of an orange as most other parts of South Africa and with carrying qualities equally good.

*Minor Citrus Varieties.*—These include lemons, limes, grape fruit, etc. No export of these has taken place; a good local demand exists for limes and lemons. Grape fruits should find acceptable surroundings in some part of the coast; arrangements are being made for testing them at Winkelspruit.

*Pines.*—Pine apple culture in Natal is an expanding industry. Certain circumstances connected with it will probably see it take second place to the Albany District of the Cape, but given greater attention by the right kind of white man, the future should be a bright one.

Some 2,500 cases were exported last year, as against 923 from the Cape, principally of the Queen variety. These carry well and open up in good order; they are lighter in colour and less full in flavour than the Albany article, but have a rather better appearance, are more uniform and have better crowns. The Standard orange box has been used for shipping them in, holding some 32 fruits each. Although this makes a good receptacle and an economic one as far as saving of space is concerned, I am of opinion that shipping in boxes to contain 1 doz. will pay better. This is the system adopted by Cape exporters, and their product always fetches more than does the Natal article.

Cayenne pines formed 25 per cent. of the whole export. The large size of this fruit, its delicate skin and large moisture content render it difficult to transport properly. I am by no means sure that it should not be carried in the cold rather than the cool chamber on board ship. Experiments are being carried out with the object of discovering the best conditions under which to handle these fruits, and a report should be found from Cedara dealing with the subject.

*Bananas.*—Natal is the Province in South Africa par excellence for the cultivation of the banana. Climate, soil, and other conditions are nearly all suitable; the labour engaged in the industry is nearly all Indian, and whilst that may not be in accordance with certain principles the fact remains that the banana industry of Natal is being well handled. The demand for this fruit is so great in the other Provinces of the Union that no attempt has ever been made to extend the export beyond the actual confines of South Africa. Some few hundred cases are disposed of annually to German East and South-West Africa and also to Portuguese East. Prices, whilst not exactly high, are remunerative. There is room for some expansion and development before the needs of South Africa are fully supplied, but I do not anticipate any export of South African bananas to Europe, at any rate for many years to come.

*Mangoes and Avocados* are bracketed because, though both do well enough in Natal, neither has made a success so far in the export market. Climatic conditions, principally atmospheric, do not appear to be conducive to good carrying of the mango, and it is only during the last year that the avocado has given any encouragement to exporters. With increased care in growing and packing a business in this fruit may eventually arise. It is to be feared that the same cannot be said of the mango, until such time as the tree may be planted further inland.

#### FRUIT PRODUCTION IN THE O.F.S.

The Orange Free State cannot be classed as a fruit country as a whole; there are a few portions, however, which produce excellent stone fruits, including cherries, and where the apple attains perfection. Indeed, South Africa's largest apple orchard, the property of Mr. H. E. V. Pickstone, consisting of over 36,000 trees, is situated in the Ficksburg District. It may be said that, broadly



speaking, the conquered territory with portions of the Northern and Eastern Districts of the Province are the best for fruit culture in the Free State.

The outstanding feature at present is the very large numbers of apple trees, both already standing and being planted. The crops resulting from these trees will in a few years' time perforce be exported, and in that direction thought has already been given to details, such as boxes, transport, etc. When the time comes, Free State farmers will find themselves in just as favourable a position as any others in the Union. Perhaps the best apples South Africa can produce are grown on the eastern high veld of the Transvaal and Orange Free State. Good, deep, suitable soil and a long winter dormant period both tend to the production of good fruit; the only drawback is an occasional hail-storm, and these may be evaded to a great extent, just as high winds and frosts may be, by exercising sound judgment in the selection of a site for the orchard.

My thanks are due to various officers of the Department who have at times rendered me valuable assistance; also to the members of my staff, who have done their duty wholeheartedly at all times.

I have the honour to be,

Sir,

Your obedient servant.

R. A. DAVIS,

Chief, Division of Horticulture.

#### REPORT OF THE GOVERNMENT FRUIT INSPECTOR, CAPE TOWN.

The first shipment of citrus fruits went forward on June 11th, after which date weekly shipments were made up to and including September 21st.

The following were the total quantities offering, *viz.*:—

	<i>Navel Oranges.</i>	<i>Seedling Oranges.</i>	<i>Nuartjes.</i>	<i>Lemons.</i>
	3,553 cases	13,867 cases	5,381 trays	91 cases
Of the above the following were submitted for inspection ...	3,553 ..	11,676 ..	5,183 ..	91 ..
From which I rejected as unfit to receive the Government Brand ... ..	485 ..	864 ..	462	—
Of these the shippers sold locally	73 ..	621	—	—

A great improvement can still be made by some exporters in the selecting, grading and packing of their fruit.

1. Altogether too large a quantity of fruit affected by Red Scale is being packed and too many "puffy" oranges; this class of fruit will not carry. Too many specimens badly blemished by wind and other causes, which give the fruit a very unattractive appearance. I wish to impress upon exporters that they will never create a demand for their fruit if they do not exercise more care in the selecting of the same.

2. There have been some cases of very bad grading during the season under review; a large number of packers evidently are still trying to grade by eye; this is absolutely impossible considering that there are nine grades between and including fruits  $3\frac{1}{2}$  inches in diameter and those of  $2\frac{7}{16}$  inches. For those who intend shipping only a small number of boxes a very simple little grader can be made at a cost of less than £1. This same grader I use in my demonstration work when I am visiting the different districts. However, for those growers who ship in large quantities it is economy to get a proper machine. These are now being manufactured in South Africa and are obtainable at a very reasonable cost.

The prices realised for citrus fruits have been very satisfactory. I would like therefore to again impress upon packers the urgent need of using the greatest care in the handling of their fruit. It is only by the exercise of the closest attention and the use of sound judgment that they can expect to make a success of the business.

[U.G. 2—'15.]

## DECIDUOUS FRUITS.

This season has been a record one both for quantities shipped and also for duration of season. The first shipment was made from Cape Town on November 29th, and the last on May 9th, during which period the large quantity of 6,457 tons was sent. Previous to this season the largest tonnage sent was in 1912, amounting to 4,096 tons, whereas last year only 2,970 tons were sent.

## FRUIT EXPORTED.

Kind of Fruit.	No. of Boxes Packed for Export.	Boxes not Passed	Boxes not sub- mitted for Inspection.
Pears .. .. .	161,220	3,097	6,719
Grapes .. .. .	121,060	5,606	1,010
Plums .. .. .	85,670	2,232	13,384
Peaches .. .. .	58,328	2,806	2,763
Nectarines .. .. .	8,926	315	45
Melons .. .. .	5,840	—	—
Apricots .. .. .	3,590	829	1,084
Mangoes .. .. .	402	—	—
Apples .. .. .	223	57	—
Pomegranates .. .. .	199	54	—
Quinces .. .. .	181	2	—
Figs .. .. .	7	7	—
Prunes .. .. .	2	—	—
Total .. .. .	445,648	15,005	25,005

There are at times complaints made that the "grades" of the different fruits are too high, yet it will be seen more than 50 per cent. of the fruit inspected consisted of the two higher grades, "Ex Sel" and "Selected," whereas if the grades had been too high there should surely have been a much higher percentage of "graded" stuff.

I am pleased to report that the fruit has been exceptionally free from disease; the grading has been better, and the fruit has been in a much better stage of ripeness than in previous years.

There were nearly 75,000 boxes of Bon Chretien pears sent; a number of shippers make the mistake of packing this variety in a too ripe condition, with the result that the fruit arrives on the market "wasty." This is borne out in the Trade Commissioner's reports. This pear is not a good keeper, and should never be packed ripe.

There was very heavy shipping of peaches this year, and in spite of the large quantity offering the quality on the whole was better than it has ever been. Some exporters still continue to send yellow fleshed peaches. If they keep on doing so I feel sure they will suffer loss. It has again been proved that this class of peach will not stand cold storage.

The average quality of the grapes was not up to that of previous years, the size of the berries being smaller and the bunches varying very much in regard to size. Further, quite a quantity were affected by Oidium. Grapes so affected will not keep, but go wasty and spoil the whole pack.

Grapes should never be packed within a week after they have had rain on them.

We have not yet apparently secured the right package for grapes. In some experiments this year I packed 5 lbs., 6 lbs. and 10 lbs. to the box. The first consignment arrived on the market in good condition and realised satisfactory prices. The 5 lb. boxes realised the best prices, up to 6s. 6d. per box. The following week the same number of boxes were sent, packed in the same manner; this lot arrived in a wasty condition. They were *gathered three days after a rain*, and only realised 1s. per box. The varieties used were Hermitage and White Hanepoot.

There were 223 boxes of apples exported this season, and the time has arrived when we should arrange for a standard box for packing apples. This trade is bound to increase, so we should start in the right lines from the beginning.

Over 13,000 boxes of plums were shipped which did not come under inspection. These consisted mostly of Wicksons and Burbanks. Both sorts were in a very green condition, and were no doubt sent by speculators who were trying to capture the early market. I have carefully watched the weekly reports of the Trades Commissioner; I do not possibly see how it could have paid to send this stuff. However, whether they paid or not, I feel convinced that they spoilt the market for these varieties for the whole season. I believe that at no time during the season did Wicksons go over 3s. 6d. per box.

There was only one shipper who did not have his fruit inspected at some time or other during the season. He told me candidly that he did not come under inspection, as he knew a lot of his stuff could not be passed.

I trust that there will be a considerable increase in the cold storage accommodation provided on the mail boats for next season's business. Prices realised this year have been satisfactory, and I feel sure that there will be a big increase in the quantity exported next season; therefore, if more accommodation is not provided, there will be large quantities of fruit held over from week to week.

#### COLD STORAGE EXPERIMENTS.

Assisted by Mr. Tribolet, Horticulturist of Elsenburg College, I carried out some further experiments with the object of trying to ascertain when grapes are at the best stage of ripeness, in so far as their sugar content is concerned, to arrive in Europe in the best condition.

The following grapes were used:—

- 2 boxes of Hermitage.
- 6 boxes of White Hanepoot.
- 8 boxes of Red Hanepoot.
- 8 boxes of Raisin Blanc.
- 6 boxes of Barbarossa.

This season has been one in which it has been very hard to get the sugar content up in grapes, and although all those which I had for these experiments appeared and tasted quite sweet they ranged very low when tested:—

- Red Hanepoot ranged from 17.30 to 22.60.
- White Hanepoot ranged from 11.30 to 21.00.
- Raisin Blanc ranged from 12.20 to 19.90.
- Barbarossa ranged from 11.50 to 16.50.
- Hermitage ranged from 16.44 to 19.40.

*Red Hanepoot.*—Every box, with the exception of one, that showed a lower sugar percentage than 20.00, turned out very unsatisfactory. The one exception showed the extraordinary low percentage of 15.70, yet after storing opened up in perfect condition. This is to be accounted for by the fact that these grapes were from young vines growing on a hillside in light, loamy soil.

*White Hanepoot.*—All these showed a very low sugar test except one box, which was 21.00; one box showed the extremely low percentage, for this variety, of only 11.30; this box went very wasty.

*Raisin Blanc.*—There was very little difference in the keeping qualities of the different boxes of this variety. The three boxes received within a week after rain, however, went very wasty; those grown in light soil, although showing a low sugar percentage, invariably kept well.

*Barbarossa.*—This variety is naturally one with low sugar content. One box tested only 11.50 and went very wasty; the balance turned out well.

*Hermitage.*—The two boxes received were from one vineyard. They both turned out very unsatisfactorily.

These experiments, as did last year's, have again shown that it is useless to try and export unripe grapes. Further, that climatic conditions have more influence on the carrying qualities than anything else, and as stated earlier in this report, it is very risky to pack grapes within a week after rain has fallen on them.



I wish to put on record my appreciation of the services of my staff. We had to work day and night during the busy part of the season, and I feel sure that it was only through the loyalty and energy they displayed that I was able to do the work both expeditiously and economically.

(Signed)

RALPH J. BULMER,

Government Fruit Inspector.

May 28th, 1914.

Warmbaths,

13th June, 1914.

The Chief, Division of Horticulture,  
Pretoria.

Dear Sir,

I have the honour to submit herewith my report of work done and progress on this Station for the year ended March 31st, 1914.

A good number of letters, both official and from farmers, has been dealt with. About 400 were written. A good percentage of these were in reply to requests for advice and instruction with regard to fruit growing.

I was granted six months' leave during the year. This was spent amongst the fruit growers of the Western Province, and was an experience useful both to the Department and myself.

In common with a good many other parts of the country we had a bad season. During the twelve months ended March 31st, 1914, we had 18.78 inches of rain.

This fell on 51 days, and mostly in little showers, and in consequence very little water was conserved for irrigation purposes for the remaining 314 days.

There were five hailstorms during the year, three in October doing the most damage. All of the deciduous fruit was destroyed, and a lot of the citrus fruit badly marked. We experienced very few frosts, the heaviest being 4 degrees only. The summer was very hot; the thermometer registered up to 112 in the shade.

Comparative Schedule of Rainfall for last five years. Rainfall calculated from 1st April to 31st March.

Year.					Inches.	On Days.
1909-1910	..	..	..	..	32.86	74
1910-1911	..	..	..	..	20.53	66
1911-1912	..	..	..	..	21.82	62
1912-1913	..	..	..	..	15.60	56
1913-1914	..	..	..	..	18.78	51

Velvet and Kaffir beans were planted between the trees in December and January, and a fair crop was ploughed in during March following. No artificial fertilisers were applied during the year. The results from the manures applied last year are only apparent this.

After going carefully through the different plots I found that the trees dressed with a complete fertiliser gave the best results. This contained Nitrate of Soda, Superphosphate and Sulphate of Potash.

The whole orchard was ploughed early in the season, and then again in March to turn under green manurial crops. The cultivator and hoe were kept going constantly to keep the place clean and to prevent evaporation as much as possible. For ordinary orchard practice one ploughing early in the season would be sufficient. All the citrus trees were irrigated twice, once in June and again in August. The amount of water applied altogether was about 75,000 gallons per acre. Two systems were tried, one by wetting all the ground with the exception of that near the trunk; in fact no water was applied on the ground covered by the branches.

The other method was by means of deep furrows. Six deep furrows were ploughed between two rows of trees and the water allowed to flow slowly down. I am not quite sure yet which is the better method, but am rather inclined to favour the first one, as our soil is shallow and the drainage is too good if anything. On deep soils the furrow system would probably be the best.

A good crop of deciduous fruit set, but the hailstorms completely put it out of the market, and hardly a sound fruit was harvested. Owing to the drought the citrus crop was very light and poor in quality, most of it was hail marked. In my last report I mentioned that only a small crop could be expected, in fact the crops turned out lighter than was anticipated, the trees only bore an eighth of what they should, and would do in a good season. The crop to be harvested in 1914 and 1915 will be even less than last. This is not altogether an unmixed evil, as it gives the trees a better chance to fight the drought; they made practically no new growth at all last summer.

#### CITRUS TREES.

The following list gives the varieties suitable and recommended for planting in this and like districts:—

##### *Oranges :*

Riverside Washington Navel.  
Valentia Late.  
Du Roi.  
Pineapple.  
St. Michael.  
Malta Blood.  
Jaffa.

##### *Lemons :*

Villa Franca.  
Genoa.  
Eureka.

##### *Naartjes :*

Beauty of Glen Retreat.  
Flat Mandarin.  
Californian.  
Natal Naartje.

##### *Limes :*

East Indian.

##### *Grape Fruit :*

Triumph.

##### *Apricots :*

Royal.  
Blenheim.  
Oullin's Early Peach.  
Early Cape.

##### *Peaches :*

Jewel.  
Waldo.  
Angel.  
Pallas.  
Brook.  
Florida Crawford.

##### *Plums :*

Sultan.  
Shiro Smomo.  
Wickson.  
Climax.  
Methley.

##### *Pears :*

Keiffer Hybrid.  
William's Bon Chretien.  
Le Conte.

##### *Persimmons :*

Tanenachi.  
Among.  
Orange Seedless.

##### *Loquat :*

Premier.

Practically all the work here is experimental, if it were not so the Station would not justify its existence. This Station could be made to pay handsomely, but it would have to be at the expense of its experimental and educational value to the country.

If we were out for profit only fully 85 per cent. of the trees would have to be worked over to other varieties. Although it sounds paradoxical, we often get the most profit from failures in experimental work.

It is a fact that, owing to negative results, we have been able to save farmers from wasting quite a lot of money by advising them not to plant varieties of trees that have shown their unsuitability for particular districts.

A good deal of time has been devoted during the past seven years to finding out the most suitable and best stocks for citrus trees.

The following have been amongst those used for stocks:---

Rough Lemon.  
Mandarin.  
Shaddock.  
Mazoe Lemon.  
Sweet Lime.  
Pomelo.  
Sweet Orange.  
Trifoliata.  
Florida Sour.  
Bitter Seville. Mandarin on Lemon (double worked).  
Orange on Lemon (double worked).  
Sweet Lime on Lemon (double worked).

A bulletin dealing with this matter more fully than can here be attempted is in course of preparation and may be had on application.

Interesting details have also been secured as to the varying effects exerted on the shape of the fruits by growing them on different stocks. In all instances it has been found that the use of the lemon as a stock has a tendency to produce an oval-shaped orange and to more or less elongate those varieties which naturally have a somewhat egg-shaped appearance. The effect of using the orange as a stock is to produce a fruit of a more globular shape.

A test was made of trees planted at different periods of the year. It was found that very little advantage was gained by early spring planting, and none at all by winter planting. Trees planted in the winter made no headway until the rainy season set in; they require a lot of attention and water. Trees planted about January straightway began to grow and kept on until the fall. It is admitted that in putting out a large plantation it is necessary to begin early, but in any case it is advisable to wait until the rainy season sets in. A test was also made between trees cut back at planting and others left as they grew in the nursery. The result was in favour of trees cut back to about 2 feet from the ground, in fact, treated in almost the same way as a deciduous tree. Of course, trees treated in this way must be protected from the sun, either by a thick coating of whitewash or by means of a grass envelope. Where white ants are troublesome, it is advisable not to use grass as a protection. Use whitewash and allow a few shoots to grow on the sunny side right up from near the ground until the top is big enough to shade the trunk. The shoots not required for permanent branches should be pinched back close to the trunk, so as to make bunches of bushy growth. When the top provides sufficient shade then these bunches must be cut away with sharp shears as near to the trunk as possible.

Trees infested with Californian and Florida red scales were thoroughly sprayed with the best washes. Two sprayings were applied within a period of twelve days. Other trees infested in the same way were fumigated once. The result was that two thorough sprayings were not half as effective as one fumigation. The initial cost of fumigation is much greater than spraying, but it is infinitely cheaper in the long run. If trees are thoroughly fumigated they should not require to be done again for three years, whereas spraying will have to be done a good many times every year, however well it is done.

The paw-paw, a most delicious and health-giving fruit, has, up to the present, received but scant attention throughout the fruit-growing world, and hitherto fruit-growers have not bothered with it to any great extent.

Very little has been written about it, and it is more difficult to get reliable data than is possible with other classes of fruit. Numerous fables have been and are still being told about its miraculous virtues. I do not intend to deal with these here, but there is no doubt that this fruit possesses virtues and good qualities possessed by no other fruit, and is probably the most wholesome of all. Eaten with grapefruit juice and a little sugar, it is a combination that should appeal to all health-seeking persons, and if universally used would perhaps send the patent medicine sales down to nothing.

Paw-paws come into bearing very young, and at less than two years old are profitable; they can be planted much closer than any other fruit-trees, nearly 200 plants can be successfully grown to the acre.

It is generally understood that paw-paws are dioecious (having male and female flowers on separate trees). This is not altogether the case, as we have trees here that have both male and female flowers on the same tree, and others where the flowers are bisexual. This was noticed after most of the fruit had set, but next year an experiment will be tried to see if these trees are self-fertile or not.



We had a tree here some time ago which was represented to be self-fertile, but upon examination it was found that it could not be so, as all the flowers were pistillate. It must be admitted that the fruit upon the alleged self-fertile trees is not as good as that on those that are dioecious, but no doubt this could be improved by selection. Probably the only real advantages of the self-fertile trees would be that there would be no ground lost by having non-profitable trees (males) in the place of fruit bearers, and there would be much less chance of crossing. Paw-paws are as bad as pumpkins for inter-crossing, and if one has a plantation of mixed varieties the seed from this fruit would be of little use for raising trees, unless special care was taken to prevent crossing with undesirable varieties. This can be done by covering small trees or side shoots with cheap calico before the blossom opens, and pollen from the desired male introduced by artificial means.

If the fruit is cut off just as soon as it shows signs of colouring, and is packed carefully, it can be transported long distances. The writer has sent paw-paws by rail to Cape Town and the fruit reached there in splendid condition. The market for this fruit can be made much larger than it is at present.

Quite a number of people have not tasted this fruit when it is at its best, and others who have and are fond of it complain that it is difficult to get a regular supply of good fruit. Paw-paws require a fairly deep soil, plenty of plant food and water; they grow best where there is very little or no frost.

To get best results it is advisable to put out fresh plantings about every four or five years, as this tree begins to go off then.

Insect pests have been very troublesome this season, scale insects being very much in evidence. The following is a list of pests noticed in the orchard:—

Californian Red Scale on Citrus Trees.

Florida Red Scale on Citrus Trees.

Oleander Red Scale on Olives.

Greedy Scale on Apples and Pears.

Olive Bug on Olives.

Fruit Fly on all Stone Fruits, Olives and Loquats.

Orange Codling on Citrus.

Silver Leaf on Stone Fruit Trees.

This Station suffers a serious drawback in being surrounded by other orchards. These orchards are full of pests, and no effort is being made to control them in any way. In these places pests breed as they will, and are carried to other orchards, where a good deal of time and money has been spent to keep these pests in check.

#### CALIFORNIAN RED SCALE (*Chrysomphales aurantii*).

We could not deal with this in the most effective way, *viz.*, fumigation, as our tents are worn out and we have not been able to get any new ones yet. I hope that a grant will be given next year to purchase tents, so as to enable us to deal with scale insects in the most effective manner. The trees were sprayed four times thoroughly with Resin wash, but although it checks the scale to a certain extent it is not nearly as good as fumigation.

#### FLORIDA RED SCALE (*Chrysomphales aoninum*).

Although some of the adjacent trees have had this scale on for a number of years, we have been fortunate in escaping it until this year. The treatment used was the same as for Californian Red Scale, but Resin wash does not seem to destroy it in the way one would like to see.

#### GREEDY SCALE (*Aspidiotus repax*)

Trees sprayed in winter with Lime Sulphur wash, which acted as an effective control.

#### OLIVE BUG (*Teleonimia australis*).

Olives had to be sprayed very often; almost any contact wash seems to kill the young insects, but owing to the active habits of the adults it is difficult to deal with them. This insect must have hosts in the veld which makes it hard to eradicate.

Trees were sprayed with MacDougall's Cold Water Dip, which acts as a good control. Katakilla was also tried with good results. I think if this wash is cheap it will be the best to use.

#### FRUIT FLY (*Ceratitis capitata*).

This insect was effectively controlled by means of the Mally remedy. I find that fully 90 per cent. of the crop can be saved by using this spray in the proper manner.

#### OLEANDER SCALE (*Aspidiotus hederae*).

This insect only appeared on the olives, and it was controlled by spraying with Resin wash. Scale insects can be dealt with better on olives by spraying than on citrus trees, as the foliage does not shelter the scale to the same extent.

#### ORANGE CODLING MOTH.

The damage done by this is considerable in some orchards. We have had it here for two years, and have lost a lot of fruit through it. The trees were treated the same as for fruit fly. It appears that this controls the pest to a certain extent; perhaps it was only a coincidence that less damage was done after it was applied, but the fact remains that fewer fruits were damaged while the remedy was used.

We require to know a great deal more of the life history and habits of this insect before we can deal with it properly. All fallen fruit was picked up and buried twice a week.

#### SILVER LEAF.

This was noticed here for the first time this year, but as it does not appear to do any damage no treatment was used.

#### MACROSPORIUM DISRUPTUM.

One or two trees were affected very slightly; they were treated with Bordeaux Mixture successfully.

Although probably this disease is one of the worst that Citrus trees are subject to, I am sure from experience that it can be effectively controlled by using Bordeaux Mixture in the proper way.

We had about 500 visitors during the year, and a great deal of interest was taken in the work on this Station. Visitors take up a lot of our time, and for this reason we are often handicapped in our work. We are constantly getting letters from farmers asking for advice, and requests for practical demonstrations are numerous.

Requests have been made that an experiment be tried with the export of early peaches, etc., from this District. I should like to suggest that a trial be made next season with some of the harder varieties. The packing could be done here under my supervision.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) C. A. SIMMONDS,

Horticulturist..

## APPENDIX VIII.

## GOVERNMENT VITICULTURIST.

## ANNUAL REPORT, 1913-14.

Since the last report no staff changes took place. The work of this section was successfully continued, both at Paarl and Elsenburg. The Oenological Institute is now being built at Elsenburg and will, it is hoped, be ready for occupation before the end of the present year.

*Publications.*

- (1) "Cape Pure Levures, a preliminary study," in the April issue of the *South African Journal of Science*, 1913.
- (2) "The Reconstitution of Vineyards in Lime Soils on suitable American Stocks," Bulletin No. 48, 1913.
- (3) "The Manufacture, Properties and Uses of Brandy," *Union Agricultural Journal*, February, 1914.

## LABORATORY WORK.

1. *Analytical Work*.—Sixty-one wines were analysed, involving 117 determinations. These wines were tasted previous to analysis and then the usual ingredients were determined.

2. Several samples of diseased parts of vines were sent in during the year, the prevailing trouble being Anthracnose. Less samples were submitted for diagnosis than last year. It appears that farmers are now more conversant with such diseases as Erinosi, Oidium, etc.

*Cape Wine Levures*.—It was unfortunately impossible, under the existing circumstances, to continue the much-needed further study of the different pure levures, which have already been isolated. These will be done later on in the new Institute. It is, however, gratifying to state that in actual practice these levures have given splendid results in the hands of some of our leading wine farmers and experts. They produce a very regular and fairly rapid fermentation, which is of great advantage when the must has to be cooled, since the period of cooling is thereby considerably diminished. They further ferment out all the sugar in musts of up to and slightly over 25 degrees Balling. This further greatly ensures the ultimate soundness of the wine. During the 1914 vintage 33 bottles of pure levures were sent out on application. The results were invariably favourable.

## CELLAR, PAARL VITICULTURAL STATION.

Stock of wine in cellar on 31st March, 1914:—

(a) *Vintage 1914:*

Green Grape (light) ... ..	4 leaguers
White French (light) ... ..	2½ "
Pedro Jimenez (Sherry) ... ..	¾ "
Green Grape (Sherry) ... ..	¼ "
Stein ... ..	1¾ "
Port (sweetish) ... ..	1½ "
Port (dry) ... ..	½ "
Pontac (dry) ... ..	1 "
Jeripico (green grape) ... ..	½ "
Red Wine (mixed) ... ..	2 "
White Wine (mixed) ... ..	1¾ "
Men's Wine ... ..	2 "
<hr/>	
18½ leaguers	

(b) *Old Stocks:*

Sherry, 1911 ... ..	1½ "
Sherry, 1912 ... ..	1½ "
White French, 1912 ... ..	1¾ "
Port, 1912 ... ..	½ "
Pontac, 1912 ... ..	½ "
White French, 1913 ... ..	1¾ "
Green Grape, 1913 ... ..	1¾ "
Green Grape, 1913 (Sauterne) ... ..	¾ "
Burgundy, 1913 ... ..	1¾ "
Hanepoot, 1913 (sweet) ... ..	¾ "
Port, 1913 ... ..	¼ "
Pedro Jimenez ... ..	1½ "
<hr/>	
12½ leaguers	

Total ... 31 leaguers



## NOTES ON THE FOREGOING WINES.

1. *White French, 1914*.—The grapes were pressed when well ripe and then the sugar was only 17.2 degrees Balling, the total acidity being 4 per mille as tartaric acid. The juice was immediately separated from stalks and husks, inoculated with pure levures, which fermented out all the sugar in four days. During this time the temperature of the fermenting must was kept down by cooling. The maximum temperature of fermentation was 28 degrees C. (82.4 degrees F.). As this wine was intended to be distilled for the making of wine brandy of a Cognac type, the total acidity was raised to 7 per mille by adding tartaric acid previous to fermentation. This wine, when 2 months old, was distilled in April according to the method adopted in Cognac, and the freshly distilled brandy put into a  $\frac{1}{4}$  cask made from Limousin oak, where it now lies maturing. The wine was very good and light. Its analysis will be given later.

2. *White French, 1913*.—Composition of must: Sugar, 19 degrees Balling. Total acidity, 4 per mille as tartaric acid. This wine was made as above, with an addition of tannic acid. The wine at present is promising very well. Analyses of this and the wines still following will be found in a subjoined table.

3. *White French, 1912*.—Composition of must: Sugar, 19.7 degrees Balling. Total acidity, 4.8 per mille as tartaric acid. The juice was immediately separated from the husks and stalks, and pumped into a cement tank, when potassium meta-bisulphite was added to it at the rate of 8 ozs. per leaguer. Two days later the clear, supernatant liquid was pumped into a stukvat and inoculated with pure levures. As these levures had not previously been accustomed to high doses of sulphur dioxide, fermentation only set in after six days, when the total acidity was raised to 6 per mille by an addition of tartaric acid. The fermentation went on slowly for the next six weeks and the maximum temperature was 30 degrees Celsius, or 86 degrees Fahrenheit. The object of this experiment was:—

- (1) To see whether such doses of sulphur dioxide would so retard the fermentation as to have a low maximum temperature of fermentation, without having to cool the must;
- (2) To determine the influence that the previous clarification of the must by an addition of potassium meta-bisulphite has on the ultimate character of the wine.

As above stated, the maximum temperature of fermentation was not too high, although the must was not cooled. The drawback of this method is a slow fermentation, which lasts quite four times as long as usual. As the wine is very slow in getting bright it was fined with gelatine (1 oz. per leaguer) and tannic acid (1 oz. per leaguer) in August of the same year. This wine will be bottled next August. It is now very soft and pleasant and quite bright, and has been so for the past twelve months. This shows that the above method of vinification can always be recommended where cooling is impossible.

4. *Green Grape, 1914*.—(That of 1914 will be discussed next year). Composition of must: Sugar, 21.3 degrees Balling. Total acidity: 5.5 per mille as tartaric acid. The clear juice was inoculated with pure levures. Its total acidity increased to 8 per mille by an addition of tartaric acid and submitted to a close fermentation in a stukvat. During fermentation the temperature was never allowed to exceed 28 degrees Celsius (82.4 degrees Fahrenheit). It further received the usual cellar treatment. The wine was absolutely bright when racked in August of the same year, and has ever since remained bright. It is now a most promising light wine. It certainly proves that the treatment adopted, particularly with regard to the addition of tartaric acid, pure levures and cooling during fermentation, is the one that will, on the whole, have to be followed in order to make first-class light wines. Needless to say, the must should in all such cases be separated from the husks and stalks before any fermentation sets in. If this is not done the wine, if made from green grapes, always has a peculiar and disagreeable flavour *sui generis*, and further has more difficulty in getting and remaining bright. Special stress must be laid on this, as unfortunately, many of our wine farmers and merchants still labour under the false impression that good, *full-bodied* light white wines cannot be made unless the must has been allowed to ferment with the dops for one or more days.

5. *Green Grape (Sauterne type), 1913*.—Sugar, 27.5 degrees Balling. The grapes were crushed and immediately pressed. The must was pumped into a stukvat and potassium meta-bisulphite immediately added at the rate of 436 milligrams per litre, or about 9 ozs. per leaguer. After two days the clear

liquid was run into heavily sulphured hogsheads. Again, two days later this must started to ferment slowly. After this had been going on for nine days another 6 ozs. of potassium meta-bisulphite per leagner of must was added. This effectually stopped fermentation. A week later the fairly clear young wine was forced into well-sulphured hogsheads by a pressure pump, thus avoiding contact with the air. At the end of winter, in August, the perfectly clear wine was pumped into sulphured hogsheads, where it now still lies. The wine at present still is perfectly bright and fairly sweet, containing about  $5\frac{1}{2}$  per cent. of sugar. Although it still smells and tastes of sulphur dioxide, this has gradually got less and less, so that it will probably be no longer objectionable after the wine has become two to three years old. The experiment fully succeeded and the wine reminds one somewhat of the Sauterne wines. It will be noticed that very high doses of sulphur dioxide were necessary to check the fermentation effectually. This was mainly due to the high percentage of the sugar in the must and also to the high temperatures during vinification. Previous experiments were unsuccessful owing to insufficiently large quantities of sulphur dioxide having been used. This wine will further be closely studied and similar experiments will be carried on with the Sauterne varieties, Semillon and Sauvignon Blanc.

6. *Sherries*.—Although the real sherry varieties have been and still are being planted out at the Paarl Viticultural Station, the Sherries hitherto had mainly been made from green grapes. The 1911 Sherry was made from green grapes, registering 24.7 degrees Balling. The grapes were crushed in an egrappoir, and the dops and must allowed to ferment together for 24 hours, when the must was run off and the dops were pressed. The pressed must was then added to the rest. Immediately after the grapes had been crushed, Plaster of Paris was added at the rate of 5 lbs. per ton of grapes, and the mass was then inoculated with pure levures. The fermentation proceeded briskly in a stukvat until the temperature of the must went up to 41 degrees Celsius (104.8 degrees Fahrenheit) when the fermenting must was racked over. It fermented until it was dry, and towards the end of April it showed the following analysis: 15.19 volume per cent. of alcohol, 1.08 per mille total acids. It is interesting to note that the pure levures succeeded in forming so much alcohol, and fermenting out all the sugar at such an extremely high temperature of fermentation. The necessary consequence of this high temperature further was the high volatile acidity in such a young wine. This wine was perfectly sound and was declared to be such by an outside expert. On the 14th June of the same year it was fortified with good wine brandy up to 17 volume per cent. of alcohol. The wine was then put into hogsheads which remained three-quarters full. The wines now are three years old and have a very strong and characteristic sherry bouquet and flavour. It is surprising to find how closely green grape can thus approach a Spanish Sherry in character.

*The 1912 Sherry* was also made from green grapes (24 degrees Balling), but the must was immediately separated from the husks and stalks, inoculated with pure levures, and 4 lbs. of Plaster of Paris per ton of grapes added. The maximum temperature of fermentation was 35 degrees Celsius, and in consequence the volatile acidity was much lower than before (only 0.57 per mille). All the sugar fermented out. The wine was fortified in October with wine brandy up to 15,  $15\frac{1}{2}$ , 16 and  $16\frac{1}{2}$  volume per cent. alcohol. In no case was it found possible to make culture of *mycoderma vini* grow in these wines. Thus far they are promising well for Sherries. It is ever so much lighter in colour than the previous Sherry which fermented 24 hours in contact with its own dops. This would tend to show that pale Sherries should be made by allowing the must to ferment by itself, as is the general practice in Spain. In 1914 experiments in Sherry making were started with Pedro Jimenez and Stein.

*Port Wines*.—The first wine of this type made from Port varieties of grape in South Africa was made at the Paarl Viticultural Station in 1913, when the whole crop made about a quarter of a leagner. The different varieties were all crushed together and the must registered 23 degrees Balling. The crushed grapes were inoculated with pure levures and the must was allowed to ferment for 36 hours in contact with the husks, when it was drawn off into a hogshead and the pressed must added. This was done when the must showed about 9 degrees Balling. Sufficient wine brandy of about 17 volume per cent. was added so as to retain about 6 per cent. of sugar in the wine, which should then have just over 16 volume per cent. alcohol. On analysis this wine showed 16.12 volume per cent. alcohol, 6.06 grams. sugar per 100 c.c. wine. It certainly is a much closer approach to a genuine Port Wine than I have ever before seen in South Africa.

*Port, 1914.* In this year the grapes on the whole did not develop much sugar on account of the cool, rainy summer. The grapes showed about 22 degrees Balling. The wine was made as above. It has now a nice ruby red colour and promises well.

## ANALYTICAL DATA OF ABOVEMENTIONED WINES.

Kind of Wine.	Alcohol by volume.	Volatile acidity per mille, as acetic acid.	Total acidity as tartaric acid.	Sugar, grams per 100 c.c. Wine.	Esters, grams Ethyl-acetate per 100 c.c. Wine.	Glycerine grams per 100 c.c. Wine.
White French 1913	10.42 %	0.71	6.74	—	—	—
White French, 1912	11.59 %	0.65	5.40	—	—	—
Greengrape, 1913 ..	11.70 %	0.70	7.64	—	0.0140	—
Sauterne, 1913 ..	11.90 %	*2.30	—	5.6	—	—
Sherry, 1911 ..	17.01 %	1.16	5.51	—	0.0418	1.10
Sherry, 1912 ..	†13.98 %	0.57	6.50	—	—	—
Port, 1913 ..	16.12 %	0.72	—	6.06	—	—

\* The high volatile acidity is here due to SO<sub>2</sub>.

† Before fortification.

## VINEYARDS.—PAARL VITICULTURAL STATION.

(a) *Ampelographic Collection.*

This was extended during the 1913 season, when the following additional varieties were grafted:—

*White Table Varieties.*—Agostenga, Diamanttraube, Precose de Malingre, Sicilien Précoce, Bicane, Maccabeo, Schiradzouli Blanc, Cormichon Blanc, Citronelle, Servan Rond, Servan Blanc, St. Jeanet Tardif, Olivet Blanche.

*Red Table Varieties.*—St. Laurent, Noir hâtif de Marseilles, Duc de Magenta, Tibouren, Gros Ribier, Aliatico Nero, Trifere du Japon, Malakoff, Isjum, Danague, Muscat de Lierval, Corcichon Violet de Tivoli, Grec Rouge, Souvenir de Pulliat, Angelina, Piment, Sabalkonskoi, Ahmeur bou Ahmeur, Laubscher's Gem, Hane-poot Seedling, Graaf Reinet, Black Acorn.

*White Wine Varieties.*—Juraçon Blanc, Saint Emilion, Colombard.

*Red Wine Varieties.*—Teonlier, Aramon Noir, Grand Noir de la Calmette, Aspiron Noir, Pinot St. Laurent, Gamay Hatif des Vosges.

(b) *Port Wines.*

These are so far doing very well. They are all vigorous and bear well, although some varieties give heavier crops than others.

(c) *Sherry Varieties.*

A further 400 Pedro Jimenez on Aramon were planted out in 1913, also about 600 Aramon cuttings (Nos. 1 and 2 being kept separate) were planted, to be grafted over with Palomino and Catellano in 1914.

## (d) The following young plantations have also been established:—

- 400 Semillon.
- 400 Sauvignon Blanc.
- 1,000 White French .
- 560 Cabernet Sauvignon.
- 448 Malbec.

These are all growing well



(e) *Ohanez (Almeria) Grapes.*

These latter have for the first time given a crop, but owing to the bad summer and the youth of the vines the grapes were not considered good enough for export, so some were packed in granulated cork and some in wood wool and stored in an ordinary cool room, to see how long they would last under such circumstances. During 1915 these grapes will be exported in different ways to test their chances as an export grape on the market.

(f) *American Vines.*

A large number of cuttings of different kinds of American vines have been rooted for propagation, both at the Paarl Station and in the wine districts. These include the following new varieties: Riparia x Berlandieri 157-11, Riparia x Solonis 1616, Riparia x Cordifolia Rupestris 106-8.

(g) *Manurial Experiments.*

These have been continued as hitherto and results noted. The latter will be published in due course.

#### GENERAL WORK AT PAARL VITICULTURAL STATION.

The soil for the above new vine plantations was trenched and these vines planted out in August. A considerable number of vines had to be grafted, a fairly large number of American vine cuttings had to be cut for distribution and propagation. A comparatively large number of cuttings of the various imported varieties of grapes were sold and supplied to farmers throughout the Union. The establishment of the various trellises, both in the ampelographic collection and in the other trellised vineyards, involve a great deal of labour, as the young shoots have to be tied up from time to time. The Manager had to devote a great deal of time to the getting up of a large number of show exhibits that went to four Agricultural Shows. The general cultivation, treatment, etc., of the vineyards have been well attended to. The cellar work was likewise carried out in a most satisfactory manner, and the cellar itself has always been kept very tidy, so that it invariably struck visitors favourably. During the year the experimental station has regularly been visited by the public and great interest was displayed in the work undertaken.

#### OUTSIDE WORK.

(a) *Investigation into Grafted Vines.*

During the summer months of 1913-1914 the Government Viticulturist and the Assistant Government Viticulturist further investigated the present state of our grafted vines in the different wine districts. A report of this inspection was published in the June issue, 1914, of the *Union Agricultural Journal*. The experimental plantations of American stocks which had been started in the different wine districts in 1912 have been followed up. Some new plantations will be started this year, whilst some of the old ones had to be abandoned. All those that are fit will be grafted this year.

(b) *Shows.*

At the following Shows, grapes, wines, brandy and bottles of pure levures were shown:—Paarl, Malmesbury, Robertson, Rosebank and Cape Town Industrial Exhibition (wines only). The grapes included 110 different varieties, and these were generally admired by visitors at these different Shows. The wines included the following types: Hock, Burgundy, Pontac, Sherry, Port, Sauterne, Sweet Wine. The sample of brandy was of Cognac type. These wines, as well as the brandy, have all been made from grapes grown at the Paarl Viticultural Station. Pamphlets published by the Government Viticulturist on various viticultural and wine-making subjects have been exhibited and distributed amongst Show visitors, who especially requested them. The Government Viticulturist acted as judge of wines, brandies, vinegar and grapes at the Robertson, Worcester and Rosebank Shows.

(c) *Lectures.*

The following lectures were given during the year:—

(a) By the Government Viticulturist:

American Stocks, grape varieties—2 lectures at Elsenburg.

Wine-making—1 lecture at Groenberg.

The Manufacture, Properties and Uses of Brandy—1 lecture at Paarl.

Brandy—1 lecture at Prince Alfred's Hamlet.

Wine-making—1 lecture at Prince Alfred's Hamlet.

(b) By the Assistant Government Viticulturist:

Manuring of Vineyards—9 lectures at Elsenburg.

Vine Diseases—6 lectures at Elsenburg.

*(d) Visits to Farms and Wineries.*

During the year under review both the Government Viticulturist and the Assistant Government Viticulturist again visited a large number of farms and several wineries, in order to investigate vine troubles on the spot, select suitable sites for the establishment of vineyards, give advice on manuring of vines, etc., and to taste and sample wines.

## GENERAL REMARKS.

The last summer has been an abnormal one, inasmuch as cool and rainy weather was experienced during the greater part of it. The result was that vines were most severely attacked by Anthracnose and Oidium in the Constantia, Stellenbosch and Paarl Districts. On the other hand, this weather favoured the development of the large crop of grapes which the vines had on them, so that the 1914 vintage was a large one. Many farmers in the Paarl and Stellenbosch Districts obtained over 50 per cent. and more than the previous year, which also was a good one. The large crops resulted in a less good quality of grapes. Generally the ripe grapes had about 2 per cent. sugar less than in a normal year. It must unfortunately be stated that during the 1914 vintage a lot of inferior wines were made. During 1913 wine was firm in price. It started at about £5 per leaguer, and owing to the special Excise legislation went up to £10 during the latter half of the year. During February and March £4 10s. to £5 per leaguer was paid for the young wine of the 1914 vintage. Owing to the large crop prices soon fell to £3 per leaguer, and at present £3 10s. to £4 is offered for ordinary wine. It is to be expected that the price of ordinary wine will go up to £5 per leaguer during the latter half of this year.

During the last year over 1,000,000 vines have been planted, and if this continues an over-production is bound to ensue within the next four or five years. More attention should be paid to the exportation of table grapes, not only to Covent Garden but also to the other big centres of distribution and consumption in the world. More attention might also be paid to the making of raisins, and in particular of Malaga raisins. Such an over-production can further be met by developing an export trade, particularly in fortified sweetish wines of a Port, Sherry, Madeira and Marsala type, and possibly by a full-bodied red wine of a Burgundy type. If proper attention is paid to the making of good Cape brandy of Cognac type this article could well be exported at remunerative prices.

In conclusion I wish to thank the members of my Staff most heartily for their continued good services rendered to this Division. Since my additional appointment as Principal of the Elsenburg School of Agriculture a still larger share of the work has devolved upon the Assistant Government Viticulturist. This he accomplished so satisfactorily that the work of this Division has in no way suffered through the change. Further, it affords me great pleasure to testify to the excellent manner in which the Manager of the Paarl Viticultural Station carries out his duties.

A. I. PEROLD,

Government Viticulturist.

## GOVERNMENT WINE FARM, GROOT CONSTANTIA.

ANNUAL REPORT, 1913-14.

Wynberg,

Secretary for Agriculture.

I beg to submit herewith my report on the working of the Government Wine Farm at Constantia during the year ended 31st March, 1914.

During the above period the average daily attendance of monthly paid men was 2.70, of daily paid men 9.40, and for a period of nearly nine months of convict labour the attendance averaged 16.1 units.

The substitution of free labour by convicts was to meet with the requests of members of the local Fruit Growers' Association who, owing to the dearth of farm hands in the District, represented that more labourers would be available for them in the event of the employment of convicts on this Estate, and for the afforestation at Tokai. The change, owing to the improvidence of the free labourer, is in a sense welcome, as it secures regular attendance, but on the other hand the operations suffer in finish, for neither the Kaffir, Hottentot, nor members of mixed native races received from mining or sheep-rearing districts, are nimble wielders of seccateurs or delving implement, and further, no sooner have these attained an average amount of competence than they again receive liberty, and raw recruits fill the gaps. For these reasons it was found necessary to retain the free men for some considerable time, until all pruning, etc., could be finished. By careful selection and patience the more intelligent convicts were trained, and as time proceeded the free men were sent off by degrees. The retention of a few is, however, necessary for ploughing, transport, etc.

As the convicts arrived during the middle of the pruning season they were chiefly used for delving the orchards and vineyards, and clearing new tracts of land.

Hitherto the Management was run single-handed, but owing to a request from the Constantia Fruit Growers' Association that the Manager's services should also be at the disposal of the viticultural interests of the Western Province, an assistant has been appointed, which consequently gives more time for the above purpose, also more time has been found available for experimental work.

The revenue collected reached about £1,748, which is considerably less than the previous years, and is due mainly to injunctions received that all fit fruit be exported, in preference to the acceptance of a local offer of 3d. per lb. for the Williams pears alone. Had the latter course been adopted a further sum of £298 would have accrued, representing practically a clear profit. Instead, 554 boxes were exported, which realised about £73. These prices may have been better, but that is questionable, for all fruit was shipped as graded only, but in so doing the Management sought to follow in the steps of the most successful shippers, who run matters upon a commercial basis.

The revenue for the year further suffered in that amounts realised oversea are only brought to account the following financial year.

The expenditure ran up to £1,742, but this amount does not represent alone actual expenditure in pushing farming operations, for monies are absorbed in experimental work and in machinery requisite for experiments, as for instance, a sum of £50 was employed in the importation of a yeast multiplier, another £50 contributed to the expenses of the installation of an electrical plant for the ozonisation of wines, all considered very necessary for the advancement of wine-making, and in order to reach perfection in the art. Certain amounts are also spent on the maintenance of students who attend to obtain practical knowledge, four of whom have been in attendance.

*Vintage, 1914.*—Wine-making commenced at the usual time and occupied the usual period; weather and temperature were suitable. The crop crushed at 15,689 gallons, of the following kinds, viz.:—

White French	...	...	...	2,932	gallons
Press Wine	...	...	...	3,552	"
Hermitage	...	...	...	5,369	"
Riesling	...	...	...	1,799	"
Muscadel	...	...	...	284	"
Cabernet	...	...	...	1,753	"



The quantity is in excess of last year's return by 1,949 gallons, and may have been still larger had Hanepoots again been used for wine-making.

It has been handed down to us by European oenological experts that the most approved methods in the art of wine-making obtained during the last 25 years are the accurate and intelligent use of sulphurous acid, the use of pure yeasts, and the control of temperatures. These approved methods were therefore followed, as nearly as possible, during the vintage.

With regard to the first named, *viz.*,  $\text{SO}_2$ , the practice has been in vogue here for the last eight years in connection with the white wines. In red wines it has been more sparsely used owing to a risk of spoiling these wines by the formation of sulphuretted hydrogen, which invariably developed when heavy doses were used. It is now found that doses of 4 to 6 ounces per leagner are quite safe provided that the musts are well aerated for 5 to 10 minutes, thrice daily, during the first two days of fermentation. The aeration is done by pumping the air into the mass with an ordinary wine pump, the hose of which reaches well to the bottom of the fermenting vat.

In every case spontaneous fermentation was checked by the addition of sulphur of varying quantities according to the temperatures of the must. Twenty-four hours afterwards these were inoculated with one per cent. of active pure yeasts, which had previously been multiplied in a newly-imported Zymogene yeast multiplier, a machine capable of sterilising by heat about 30 gallons of must in about three hours.

For the white wines, Champagne yeasts, imported from France, were used, and for the red wines Claret and Burgundy yeasts, also imported, were used. In every case, as far as alcohol volatile contents are concerned, most satisfactory results were got, indicative by the following results, *viz.*:—

	Alcohol.		Volatile Acid.	
Claret type .. .. .	11.9	vol. %	0.37	per mille
Claret type .. .. .	13.7	"	0.43	"
Cabernet .. .. .	12.0	"	0.38	"
Cabernet .. .. .	13.0	"	0.42	"
Hock .. .. .	11.4	"	0.36	"
White French .. .. .	11.6	"	0.46	"
Stein Reisling, White French blend ..	11.8	"	0.37	"

In every case the wines ran out dry. The volatile content is the lowest obtained for the last eight years, during which period 0.5 per mille was occasionally got, and generally 0.6 per mille, no doubt owing to the presence of apiculate yeasts. With spontaneous fermentation and also with selected pure levures, isolated on the Estate, no such results were ever obtained. Laboratory experiments were also conducted for the purposes of comparison, in which several kinds of local levures were included. In this instance, as will be seen from the following tables, the volatile content is in all cases higher, but is due to the omission of sealing the bottles when fermentation had ceased. In every case all conditions were equal.

Levures.	Duration of fermentation in days.	Alcohol.	Volatile.	Deposit in grms. per Litre.	Temperature.	
					Max.	Min.
Champagne .. .. .	12	12.2	0.68	3.00	22	15
Claret, Levures .. .. .	15	12.9	0.84	4.00	23	15
Burgundy .. .. .	14	12.5	0.74	4.45	23	15.5
Paarl Oenological Station	11	11.6	0.87	4.85	23	18
Local Yeast .. .. .	15	12.8	0.67	4.41	23	15.5
Wild Yeasts .. .. .	28	0.7	0.3	—	—	—
Wild Yeasts (Apiculatus)	28	4.0	3.08	—	—	—

It will be noted that for alcoholic formation under the laboratory conditions the imported levures were the most efficient; a high standard was also obtained with a local true yeast. In most cases also the deposit from the pure levures is higher than any other. These results very nearly approach those found by similar investigations in other warm countries, and also proves that better results are got from French levures when used in hot climates than those obtained from levures isolated in these warmer climes.

The work of the wild yeasts and that of the pure levures clearly shows that a wide limit exists with regard to the production of volatile acidity, and that when the former are in predominance sour wines must result, which should be an object lesson to wine makers who still pursue the old methods of spontaneous fermentation without sulphuring.

By these latest developments, namely, the strict observance of cleanliness, the use of sulphur in the form of meta-bisulphide of potassium, pure levures, and control of temperature, great advances have been made, and the different factors in wine-making can now be controlled almost as positively as they are in beer brewing, and there now appears to be no reason whatsoever for the existence of bad or spoiled wines in any cellar.

Further report upon the development of the 1914 wines must be deferred at this early stage.

Ozone has for some time, for some 18 or 19 years now, been utilised for the ripening of wines and brandies. At the early stages its application was somewhat clumsy and expensive, and its utilisation on a large scale did not meet with financial success. Later methods were perfected, and it is now used on a much larger scale. Some of these plants have been introduced into this country by Mr. W. J. Smuts, and one of them has been installed on this Estate in order to test its effects on the wines. The plant in short consists of a high tension electrical coil, from whence a current of electricity is connected up with a hollow cylindrical porcelain tube, situated near the base of which is a porous joint; down the hollow of the tube is conducted oxygen gas from a cylinder, at low pressure: ozone is then formed in the porcelain tube when the oxygen and electricity come in contact; the ozone in turn streams through the porous joint of the tube. This tube is suspended down the bung of the cask into the wine, and as the ozone emits it diffuses through the wine and then exercises its oxidising effects.

In this way wines and brandies can be artificially matured, when a slight esterification and consequent mellowing of flavour is produced.

This treatment produced no good results on the light wines, white or red, which cannot stand the treatment for even five minutes, when all bouquet is destroyed and the wine becomes flat. The heavier red wines with considerable extract are mellowed with from  $\frac{1}{4}$  to 1 hour's treatment, the analyses of which in one case resulted as follows, *viz.*:

Before treatment, alcohol 12.7 per cent. vol.: volatile acid, 0.840 per mille.

$\frac{1}{4}$ hour	..	..	Alcohol	12.6	Volatile Acid	0.876
$\frac{1}{2}$ "	..	..		12.3	"	0.924
1 "	..	..	"	12.1	"	0.924
$1\frac{1}{2}$ "	..	..	"	12.1	"	0.936

It is apparent that the longer the treatment the greater the development of volatile contents. Amelioration is also brought about by disposition of colouring matter and tannin. More favourable results are, however, obtained with the treatment of fortified wines, such as Sherries, Ports and Liqueur wines; here it is most marked, rendering them soft and mellow, and thus hastening age.

Its effect on brandy is shown by the following analysis done by Mr. Muller, of the Analytical Branch, of a sample three months old, treated for different lengths of time, as follows, *viz.*:—

Treatment.				Nil.	10 hours.	20 hours.
Alcoholic strength apparent	..	..		10.7 o.p.	9.1 o.p.	6.6 o.p.
Alcoholic strength, real..	..	..		9.7 o.p.	9.3 o.p.	7.0 o.p.
Alcohol by volume, %	..	..		62.6	62.4	61.1
Extract	..	..	..	.078	.086	.087

In grammes per 100 litres of absolute alcohol :

	Nil.	10 hours.	20 hours.
Volatile Acid .. .. .	55.2	58.8	54.0
Compound ethers .. .. .	214.7	242.9	252.8
Higher alcohols .. .. .	369.6	352.0	309.8
Aldehydes.. .. .	18.4	20.4	17.3
Furfural .. .. .	Nil	Nil	Nil
Total secondary constituents .. .. .	657.9	674.1	633.6

Mr. Muller remarks that the treatment has decreased the amount of higher alcohols in approximately the same ratio as the resulting increase effected in the proportion of compound ethers. This treatment must therefore be of great benefit if applied to some of the remarkable brandy produced in this country, possessing abnormal quantities of higher alcohols, indeed in some cases startling amounts.

A light red and a light white wine, also a sweet wine from the Estate, were submitted for competition at the Brewers' 1913 Exhibition in London, but only the light red was placed as a second award. A report from one of the judges, however, explained the reasons for the small success, stating that the wines had been judged according to English tastes, but considered that the wines submitted were better in quality than the competing wines. As a consequence, competitive wines were imported, with the result that it was found that they were all loaded, and in some cases rather heavily. In quality, with the exception of a Hock type, the wines were most inferior and uninteresting. The results obtained are, however, most valuable, for should it be decided to push export, the types of wines desired are exactly known, and the conviction is well home that from a quality point of view South Africa need have no qualms.

*Vineyards.*—The health of these has been sound through the season, taken collectively, in a few spots where clay predominates, and consequently colder environment, accompanied by Phylloxera attacks, the early vegetation was not so good, but as the season advanced recovery was rapid in growth and crop.

Weather conditions were somewhat prone to favour fungi attacks, which were, however, stayed by frequent application of fungicides.

A new departure suggested by Mr. Mally, Government Entomologist, in the application of sulphur to vines, was tried. It consists of applying the sulphur in the form of a spray, the sulphur used was McDougall's, and is in extremely fine division, varying quantities were added to varying quantities of water, but that mixed at the rate of 1 lb. to five gallons was found to be the best balanced mixture. This was applied to check Oidium where, as is well known, in certain spots in vineyards it is most difficult to check even with constant dry sulphuring, and more particularly is this difficult with trellised vines, but in the form of a spray the sulphur becomes attached to the fungus colonies, and when it is dry, which takes about three minutes, it exercises its fungicidal duties and destroys the Oidium most successfully. It was noticed too that from an adhesive point of view it withstands the washing effects of rain, and is not readily blown off by the wind.

A dressing of potash and basic slag was administered all round. No trouble occurred in sugar contents; on the contrary, the harvesting had to be hastened in order to prevent an excess in the case of light wine varieties, whilst the Muscadel again gave the desired quantity of sugar.

A considerable number of Frontignac have been grafted, and will be planted out this year. This addition will complete the number of varieties required for the production of the old type of "Sweet Constantia."

Further manurial experiments were conducted with artificials, but conclusive results were not forthcoming. A block of port wine varieties has been established and about 30 gallons of Port has been made, and development in this direction points to every success.

The following kinds and numbers of American stocks were distributed from the Estate, which represents a demand for the total grown:—

"1202," 81,000; "3306," 200; "3309," 200; "101-14," 4,300; Du Lot, 3,200; Metallica, 36,000; Jacque, 40,000; Aramon, 29,500; Riparia, 2,600. Total, 196,900.



*Orchards.* These are miserable on all clayey soils. In most cases they have been planted on unsuitable sites. A general all-round heavy dressing of leaf compost and potash and basic slag was dug in, and better results are expected for the ensuing year.

Winter and summer sprayings were performed. Fruit Fly and Codlin Moth infections were small. The following number of boxes and kinds of fruits were exported and realised £131 17s. 5d.: 762 cases of Pears and 27 cases of Peaches.

A larger crop than last year's of animal rations was harvested.

Outside duties in connection with wine judging and tasting, advice on treatment of wines, vineyards inspections, advice on planting of vineyards, etc., were also performed, and much time and attention has been devoted to giving practical instructions to the students in wine-making.

T. L. WATERMEYER,

Manager.



## DIVISION OF ENTOMOLOGY.

ANNUAL REPORT, 1913-14.

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## APPENDIX X.

## DIVISION OF ENTOMOLOGY.

ANNUAL REPORT, 1913-14.

Pretoria,

Secretary for Agriculture.

I have the honour to report as follows on the work of the Division of Entomology during the year March 31st, 1913, to March 31st, 1914:—

## NATURE OF DUTIES.

The work of the Division has comprised, in addition to dissemination of advice on insect problems and various investigations, the administration of the Government regulations concerning (1) suppression of locusts, (2) inspection of nurseries, (3) plant and fruit imports, and (4) restrictions on the conveyance of plants and fruits.

## STAFF.

The staff of the Division remains inadequate for needful attention to the acquirement of new knowledge on insect pests, nearly all the officers qualified for investigative work having most of their time taken up with administrative and routine duties; and the inspection work at the ports continues to be entrusted to officers who have no technical knowledge of insects and plant diseases. The Division, however, is considerably better staffed than at the beginning of the year. Two vacant posts have been filled, an officer who had been on special leave for several years to study in America has reassumed duty, and a technical assistant has been added. On the other hand, the clerical strength has been reduced by one member. The technical and general staff, with the nature of the chief duty of each member, was as follows at the close of the period:—

## HEADQUARTERS AT PRETORIA.

- Chas. P. Lounsbury, Chief of Division.
- Claude Fuller, Assistant Chief. In charge of enquiries and local investigations.
- D. Gunn, Entomologist. Investigator, and in charge of insectary and collections.
- F. Thomsen, Plant Inspector, 1st Grade. Locust Officer and Technical Assistant.
- A. E. Kelly, Senior Nursery Inspector. In charge of nursery inspection.
- J. W. Hodgson, Plant Inspector, 2nd Grade. Assistant Nursery Inspector.
- B. Delport, Plant Inspector, 3rd Grade. Local Inspector to enforce special Pernicious Scale regulations, and Junior Assistant for nursery inspection.

## HEADQUARTERS AT CAPE TOWN.

- C. W. Mally, Entomologist. In charge of investigations in Cape Province and supervisor of local administration work.
- C. P. van der Merwe, Entomologist, Investigator.
- S. M. Wood, Assistant to Entomologist. General assistant.
- A. J. Attridge, Plant Inspector, 3rd Grade. Inspector of Plants, Fruits, Potatoes, etc., at Port of Cape Town, and Local Inspector of nurseries.

## HEADQUARTERS AT BLOEMFONTEIN.

- J. C. Faure, Assistant Entomologist. Investigator and in charge of general work in Orange Free State.

[U.G. 2 '15.]

## HEADQUARTERS AT NEW HANOVER, NATAL.

C. B. Hardenberg, Entomologist. Special investigation of insects injurious to wattle trees.

G. C. Haines, Assistant to Entomologist. Technical Assistant.

## PORT PLANT INSPECTORS.

*Johannesburg.*—C. W. Cloete, Plant Inspector, 2nd Grade.

*Durban.*—C. W. Morrison, Plant Inspector, 2nd Grade.

*East London.*—J. L. King, Plant Inspector, 2nd Grade.

*Port Elizabeth.*—G. Walter, Plant Inspector, 2nd Grade.

These port officers are supervised from the Pretoria headquarters. They inspect and attend to the precautionary disinfection of imports of plants, fruits, potatoes, beeswax, etc. Those at Johannesburg, East London and Port Elizabeth are assistant inspectors for the nurseries in the vicinity of their stations, and this phase of his work is of particular importance in the case of the Johannesburg officer, who further has the special duty of guarding against wrongful removals of apples and other pip fruits from Johannesburg. The Durban and Port Elizabeth officers incidentally inspect consignments of fruit for export on behalf of the Division of Horticulture, and thus are given occupation at a period of the year when their duties for this Division are light. All of the plant inspectors are further examiners of consignments of plants, a regulation requiring that plants other than nursery stock consigned by rail, post, or other public carrier, from one place to another, be inspected by them.

## EXPENDITURE.

The appropriations for the Division in the financial year 1913-1914 and the expenditure entered against the several items were as follows:—

Service.	Appropriation.	Expenditure.
		£ s. d.
Salaries, Wages and Allowances .. .. .	8,850	8,243 19 4
Transport and Travelling .. .. .	1,800	1,450 6 0
Grant-in-Aid, Imperial Entomological Bureau ..	350	350 0 0
Locust Destruction .. .. .	1,250	1,159 9 6
Labour, equipment, etc., in connection with the administration of Agricultural Pests Act.. ..	500	4 9 4
Potato and Plant Inspection at Ports, including labour, rent and railage .. .. .	4,000	1,718 17 0
Educational and Demonstrational work and other expenses in connection with plant and fruit pests	150	97 15 4
Incidental Expenses .. .. .	500	452 10 5

The saving on the salaries vote is due to provision having been made for officers on leave without salary and to unavoidable delay in filling vacant posts, and the surplus on the transport vote is chiefly due to the consequent shortage of staff and to curtailment of travelling through the Chief of the Division being on sick leave (through enteric fever) for over four months. The vote for the Imperial Entomological Bureau was for a guaranteed contribution towards the support of an institution in London maintained by subscriptions from the Governments of Great Britain and of Great Britain's oversea possessions for mutual benefit. The expenditure for locust destruction was in connection with work that will be discussed later in this report, and for the provision of a larger reserve of prepared poison for future locust destruction. The very large excess on the next vote is due to amounts for the provision and equipping of new fumigation chambers being accepted for charge against a Public Works Department vote instead of being entered against this one as was originally intended. The potato vote proved far larger than was necessary owing to the potato imports being only a fraction as large as there was good reason to expect. The remaining votes were to cover sundry expenses that could not be closely estimated.



## REVENUE.

The gross revenue (unaudited) of the division from fees levied in accordance with regulations was as follows:—

## Fumigation of imported potatoes:

Cape Town ... ..	£1,554	12	6
Durban ... ..	1,403	2	6
Port Elizabeth ... ..	707	15	8
East London ... ..	1,010	17	6
Mossel Bay ... ..	99	5	0
Pretoria ... ..	14	0	
		4,776	7 2
Fumigation of imported plants ... ..		83	13 6
Fumigation of inland plants ... ..		17	0 9
Sale of Vedalia ladybirds ... ..		4	4 0
Re-inspection of quarantined nurseries ... ..		9	1 0
Total ... ..	£4,890	14	8

There was further collected:

For stores sold under authority ... ..	£19	16	0
For nurserymen's labels sold at cost ... ..	6	1	5

*Nursery Inspection.*—Nursery inspection continues to be a prominent feature of the Division's work. It takes practically the whole time of two officers, and a considerable share, perhaps one-fourth on the average, of four others, and in addition entails much clerical work. The total number of nurseries registered during the year was 420, divided amongst the Provinces as follows:—

Cape (Western half) ... ..	184
„ (Eastern half) ... ..	69
Transvaal ... ..	112
Natal ... ..	35
Orange Free State ... ..	20

Of the 420, fully 50 have a stock of less than 2,000 plants, and at least a hundred others are very small affairs and would not be worth considering were it not for the irritation any distinction would cause amongst the more important nurserymen. One and all are treated alike.

The nurserymen are asked when registering to inform the Division what extent of ground they have under stock and what quantity of stock of different kinds they expect to have ready for sale during the season. From the information thus obtained, verified in a general way by the inspectors, the following tables were compiled:—

Nurseries under half an acre in extent ...	158
„ one-half to three acres in extent ...	180
„ three to ten acres in extent ...	66
„ ten to 25 acres in extent ...	12
„ 25 to 100 acres in extent ...	3
„ 100 and over ...	1

The total of the areas under nurseries is given as 1,269 acres, which approximates the total recorded for the previous year, 1,281 acres for 388 nurseries. The stock given for the two years was in nearest hundreds as follows:—

	1913-1914.	1912-1913.
Fruit trees .. ..	1,467,250	2,657,500
Vines .. ..	5,154,600	5,026,500
Forest and shade trees .. ..	19,299,500	17,647,200
Roses .. ..	471,300	1,217,500
Hardy ornamentals .. ..	285,100	
Palms .. ..	88,900	350,000
Greenhouse plants .. ..	177,500	

As was stated in last year's report the figures for 1912-1913 on all but greenhouse plants were probably too high. In many cases fruit trees and hardy ornamentals were counted that were not expected to be saleable during the period, the nurserymen in that year not being informed that only saleable stock should be reported. The large difference on greenhouse plants is accounted for by the omission of field-grown carnations from the 1913-1914 figures.

By Government Notice 546 of 1st April, 1914, all nurseries devoted exclusively to carnations, and all in the south-western districts of the Cape Province devoted exclusively to vines and confining their trade to these districts, will be exempted from registration and will no longer be inspected. The exemption applies to 93 vine nurseries and six carnation nurseries at present registered. The chief pests and diseases found in the vine nurseries are Root Gallworm (*Heterodera*), Phylloxera, Erinose, Red Scale, Oidium and Anthracnose. These and the other troubles found are already ubiquitous in the vineyards of the region or, like Red Scale, are of no importance as vineyard pests, or towards which nursery control measures as a means of checking their spread are of no real value. The nurseries affected are all on wine farms, and the stock is primarily for the reconstitution of phylloxerised vineyards in the vine area. To take effective measures against stock when sent out being infested with any one of the pests named would mean the closing down of the most important nurseries and consequent disadvantage to the country vastly in excess of the benefit that would be derived. It is difficult to find conveniently situated land suitable for vine nurseries, for example, that is not infested or open to a grave suspicion of being infested, with Root Gallworm, a really serious pest for many crops under certain common soil conditions. The trouble is known to occur in about two-thirds of the nurseries, and probably occurs in a much larger proportion, its confinement to the root not admitting of anything approaching a thorough inspection for it during the growing season when most of the inspection is done. And while effective measures to eliminate its spread with vines would put most of the present vine nurserymen out of business as suppliers of vines, the spread of the pest through the very much more common means of infested seed potatoes and of infested herbaceous transplants, would continue unabated. The pest, it should be added, gives trouble in Cape vineyards only in exceptional cases, as when the soil is sandy and ill-drained. The registration and inspection of carnation nurseries is being abandoned for the reasons given in connection with vine nurseries. The troubles in carnation nurseries that are likely to be disseminated with plants are chiefly of fungus nature, and these might or might not be in evidence at the time of inspection, and in any case their spread would be little influenced by nursery control. The Root Gallworm and a stem nematode occur in carnations in the country, but nursery control measures can have little influence in checking their dissemination either.

Nurserymen were given notice before they registered for the year that quarantines would be imposed on account of the occurrence of, or in the vicinity of, their stock of:—

- Pernicious Scale (*Aspidiotus perniciosus*).
- Grey Scale (*Aspidiotus africanus*).
- Spanish Red Scale (*Aspidiotus dictyospermi*).
- Red Scale (*Chrysomphalus aurantii*).
- Ross Scale (*Chrysomphalus rossi*).
- Round Purple Scale (*Chrysomphalus aonidum*).
- Mussel Purple Scale (*Lepidosaphes becki*).
- Long Scale (*Lepidosaphes gloveri*).
- White Peach Scale (*Aulacaspis pentagona*).
- Chaff Scale (*Parlatoria pergandii*).
- Araucaria Scale (*Eriococcus araucariae*).
- Araucaria Mealy Bug (*Dactylopius aurilantius*).
- Pustular Oak Scale (*Asterolecanium variolosum*).
- Woolly Aphis (*Schizoneura lanigera*).

Pernicious scale was found in one Pretoria nursery, as recorded in the section of this report on this insect. Effective stamping-out measures were at once taken, and hence a quarantine was thought unnecessary and was not applied. Twenty nurseries during the period were quarantined in whole or in part because of other pests, and eleven others remained in quarantine from the previous year. Twenty-one in all were in quarantine at the expiry of the year reviewed, but seven of these had been discontinued, and it is probable that at least five more will be abandoned. With two or three exceptions the country would be no

worse off if all twenty-one were closed for good. Of the thirty-one quarantines in force during the year twenty-six were imposed in whole or part because of Red Scale, six because of Round Purple Scale, six because of Ross Scale, three because of Mussel Purple Scale, one because of Araucaria Scale, and two because of Woolly Aphis. The quarantines because of one species only were seventeen in the case of Red Scale and four in the case of Ross Scale. The Red Scale, as these numbers suggest, is much more prevalent in the South African nurseries than all the other insects named in the list. It is also the most commonly occurring and most injurious of the scale pests in South African orchards and gardens. It is widespread in all four Provinces, and the quarantines imposed on account of it are dotted all about the Union. The quarantines because of Ross Scale were all in or near Johannesburg.

According to the Province in which situated, the thirty-one quarantines are thus divided:—

Cape (Western half)	...	...	...	...	12
„ (Eastern half)	...	...	...	...	4
Transvaal	...	...	...	...	11
Natal	...	...	...	...	4

The following table is included to indicate in the most concise manner practicable the number of nurseries in which injurious insects and diseases of various kinds have been found. It is based on records of inspections under the Union Act of 221 nurseries. All vine and carnation nurseries and a number of forest and inconsequent jobbing gardener's nurseries are omitted from consideration.

	Fruit trees.	Forest trees.	Orna-mentals.	Green-house plants.
Number of nurseries stocking the class of plants indicated by heading .. ..	126	121	116	86
Number of nurseries in which the class of stock indicated was found infested with :				
Pernicious Scale .. .. .	1	—	—	—
Grey Scale .. .. .	2	7	17	—
Spanish Red Scale .. .. .	—	—	—	16
Red Scale .. .. .	65	10	40	36
Ross Scale .. .. .	2	29	30	29
Round Purple Scale .. .. .	2	—	7	47
Mussel Purple Scale .. .. .	3	—	1	—
Long Scale <sup>1</sup> .. .. .	—	—	—	—
White Peach Scale .. .. .	10	2	6	9
Chaff Scale .. .. .	—	—	—	—
Araucaria Scale .. .. .	—	—	14	—
Araucaria Mealy Bug <sup>2</sup> .. .. .	—	—	2	—
Pustular Oak Scale .. .. .	—	5	—	—
Woolly Aphis .. .. .	18	—	—	—
Greedy Scale ( <i>A. rapax</i> ) .. .. .	9	12	22	37
Olcander Scale ( <i>A. hederæ</i> ) .. .. .	—	20	30	48
Aspidistra Scale ( <i>H. aspidistræ</i> ) .. .. .	—	—	—	15
Australian Bug ( <i>I. purchasi</i> ) .. .. .	26	9	20	1
Orthezia ( <i>O. insignis</i> ) .. .. .	—	—	4	—
Soft Scales ( <i>C. hesperidum</i> et al.) .. .. .	38	16	50	56
Wax Scales ( <i>Ceroplastes</i> spp.) .. .. .	4	1	2	3
Mealy Bugs ( <i>Pseudococcus</i> spp.) .. .. .	6	2	17	60
Spiny Mealy Bug ( <i>P. nipæ</i> ) .. .. .	—	—	—	2

Citrous Aphis (*T. aurantii*) was recorded on stock in 26 nurseries, Citrous Psylla (*Trioza* sp.) in 20, (none in the western half of Cape), Black Peach Aphis (*A. persicæ*) in 13, Green Peach Aphis (*R. dianthi*) in one, Green Apple Aphis in one, Pear Aphis in 3, Red Spider in 22, Bryobia Mite in 8, Pear Leaf Blister Mite in 3, Oak Phylloxera (*P. corticolis*) in 3, Blue Gum Louse (*Rhinocola*



*cucalypti*) in 18, Thuja Aphis (*L. thujafolia*) in 23, Rose Aphis (*M. rosae*) in 35, Rose Mildew in 9, Apple Mildew in 11, Pear Eutomosporium in 15, Shot Hole Fungus in 19, Prune Rust in 19, Geranium Rust in 8, and Graphiola Fungus on palms in 4; and doubtless each of these miscellaneous troubles would have been observed in a considerably greater number of nurseries had its detection in small numbers been deemed of importance or had the inspection of all the nurseries been at times of the year when the particular trouble was in evidence. Crown Gall is recorded only in two nurseries, but it doubtless occurs in many more and was overlooked because few inspections are made during the dormant season. Argentine Ant is mentioned as having been observed in 8 nurseries, all in the Cape Province, but it undoubtedly occurs in many others. Troubles not included in the enumeration include Pear Slug and all other leaf-eating insects and a number of unidentified aphides and scale insects of little apparent importance.

Red Scale was found on citrous stock in 50 out of the 63 nurseries in which this kind of fruit tree is grown, and it was found on permanent vegetation in 6 of the 13 nurseries in which none was seen on the stock; and in addition to being in 65 out of the 126 nurseries in which fruit trees of any kind are grown, it was found on the surroundings on 26 more, making 91 fruit tree nurseries threatened by the insect out of the total of 126. Woolly Aphis was found on apple stock in 18 and on nearly permanent trees at 14 others out of a total of 62 nurseries recorded as having apple stock. These figures illustrate the need for nursery inspection. An immense improvement had been made with respect to pests in the general condition of the nurseries by inspection under pre-Union legislation; and a very marked improvement has been made under the stronger Union legislation. The position at the time of writing is much better than is reflected by the foregoing tabulation which is based on compilations made during the year, reported on from the inspections made in 1912 and 1913. At the most recent inspection of many of the fruit tree nurseries in which it was detected so little Red Scale was found on the stock that it was practicable for the nurseryman to eradicate the infestation at the time and thus escape the imposition of a quarantine; and the same is true regarding the other quarantine pests. Up to now quarantines have been imposed only when there was so high a degree of infestation that the dissemination of the pest with outgoing stock seemed highly probable. It is desirable that a considerably higher degree of freedom from the serious troubles be obtained, but the pressure must be brought on gradually to avoid the catastrophe of disorganising the nursery industry.

*Plant Import Regulations.*—No change during the year has been made in connection with the plant and fruit import regulations and the manner of their enforcement, and there seems no need to repeat the general information under the heading given in last year's report, all of which still holds good. The permits issued for the introduction of plants total to 674 against 632 in the previous year. The plants covered by them, with the corresponding date for 1912-1913, were as follows:—

	1913-1914.	1912-13.
Stock for bedding or grafting :		
Blight-proof apple .. .. .	538,300 (23 orders)	273,100
Pear .. .. .	157,000 (16 " )	55,400
Plum .. .. .	19,500 ( 7 " )	} 18,350
Cherry .. .. .	20,250 ( 9 " )	
Almond .. .. .	1,000 ( 1 " )	
Fruit and nut trees .. .. .	421 and 379 scions	421
Small-fruit plants (strawberries, black-berries, currants, etc.) .. .. .	2,393	963
Vines .. .. .	613	88
Roses .. .. .	2,251	2,922
Palms .. .. .	10,114	18,823
Carnations .. .. .	24,816	17,257
Chrysanthemums .. .. .	4,704	4,581
Trees (other than fruit) .. .. .	245 and 964 cuttings	} 12,535
Ornamental shrubs .. .. .	6,459	
Ferns, herbaceous plants, etc. .. .. .	13,559	

The above figures take no account of hop sets, asparagus roots, and rhubarb plants, of which about 6,000, 2,000 and 1,200, respectively, passed under permit, nor do they take into consideration a total of about a thousand segments of "spineless cacti" for many parties and large numbers of dahlia roots, lily crowns, etc. The apple stocks nearly all came from Australia, and the other plants from Europe; but the spineless cacti and many of the vines and fruit and nut trees came from the United States.

Pestiferous insects were found rather commonly on palms, but seldom on plants of other kinds, and without notable exceptions the insects were aphides or scale insects of kinds already established in the country. Spanish Red Scale (*A. dictyospermi*), Red Scale (*A. aurantiæ*), and Oleander Scale (*A. hederae*) were most commonly detected. All woody plants were fumigated with hydrocyanic acid gas as in previous years.

The inspection of imported fruit year after year has made the importers cautious, and in consequence few consignments were unsatisfactory from the pest standpoint during the year reviewed. One consignment of apples was fumigated on account of *Fusicladium*, and several were sorted because of a high degree of infestation with Codling Moth. Many Codling Moth larvæ were found in the crevices of the boxes in one consignment, and in this case the consignee was required to repack the fruit in clean boxes and the old ones were then destroyed. As in other years some consignments of apples from Australia bore traces of Oyster Shell Scale (*L. ulmi*), and many consignments of citrous fruits from Europe were slightly infested with scale insects of one or other of the common species on European citrous fruits, namely, Oleander Scale, Chaff Scale, Ebony Scale (*P. zizyphi*), Mussel Purple Scale, Spanish Red Scale, and Red Scale. Fumigation was required when the infestation was at all pronounced. The fruit inspected and passed was as follows:—

	Cape Town.	Durban.	Port Elizabeth.	East London.
Apples—				
Australian .. ..	10,663 boxes	12,988 boxes	170 boxes	48 boxes
European and American {	15,308 "	2,744 "	421 "	330 "
	4,805 barrels	2,368 barrels	1,413 barrels	—
	400½ "	108½ "	—	—
Pears—				
Australian .. ..	1,200 boxes	25 boxes	—	—
European and American ..	1,345 "	695 "	200 boxes	75 boxes
Oranges (European) .. ..	989 "	631 "	164 "	—
Lemons (European) .. ..	613 "	1,487 "	20 "	—
Grapes (Spanish) .. ..	335 barrels	2,406 barrels	13 barrels	—
Mangoes, etc. .. ..	—	41 boxes	—	—

These figures suggest that South Africa is not so great a fruit-growing country as it has the reputation of being amongst its own people. The apples from the northern hemisphere certainly arrived when South African apples were out of season, but of the total of 51,806 packages of apples 23,869 came from Australian sources, and were sold in competition with the local supply.

*Potato Import Regulations.*—These also remained unchanged from the previous year. Certificates to ensure that the potatoes did not come from localities known to be infected with Warty Disease were insisted upon and all consignments were fumigated with formaldehyd gas as a precaution against scab troubles.

The imports through the several ports were as follow, according to the Plant Inspector's returns:—

	1913-1914.		1912-1913.	
	Packages.	Weight (lbs.)	Packages.	Weight (lbs.)
Cape Town .. ..	58,659	4,346,381	68,896	4,758,285
Durban .. ..	54,394	4,532,129	58,311	4,617,452
Port Elizabeth .. ..	27,768	1,997,094	35,629	2,334,892
East London .. ..	39,930	2,945,361	35,311	2,479,038
Mossel Bay .. ..	4,045	269,630	3,380	240,000
Johannesburg .. ..	—	—	224	32,995
Pretoria .. ..	28	2,380	—	—
Totals .. ..	184,824	14,092,975	201,751	14,462,662

The division between table and seed potatoes as disclosed by the markings on the packages was as follows:—

	Table.	Seed.
Cape Town .. .. .	1,850,794 lbs.	2,495,587 lbs.
Durban .. .. .	539,391 "	3,992,738 "
Port Elizabeth .. .. .	84,750 "	1,912,344 "
East London .. .. .	118,200 "	2,827,161 "
Mossel Bay .. .. .	—	269,630 "
Pretoria .. .. .	—	2,380 "
	2,593,135 lbs.	11,499,840 lbs.

German houses made a deliberate attempt to capture more of the trade, but still get only a moderate proportion of it, as is suggested by the following table, showing the country of origin of the potatoes:

	1913-1914.	1912-1913.
Great Britain .. .. .	3,499,865 lbs.	2,502,289 lbs.
France .. .. .	8,176,874 "	10,385,337 "
Germany .. .. .	1,749,584 "	794,686 "
Holland .. .. .	261,116 "	244,662 "
British East Africa .. .. .	279,176 "	295,688 "
Other Countries .. .. .	126,310 "	

The following table shows the continued partiality for the Early Rose and Up-to-Date varieties, and is inserted to record for reference what other varieties are coming into the country for seed purposes. It indicates that the growers in the area served by the Ports of Durban and East London take more interest in new varieties than do the growers served by Cape Town and Port Elizabeth:—

Variety.	Cape Town.	Port Elizabeth.	East London.	Durban.	Mossel Bay.	Pretoria.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Early Rose .. .. .	3,588,118	1,076,273	992,784	1,942,172	153,450	—
Up-to-Date .. .. .	464,726	696,369	1,712,262	1,730,585	79,720	1,600
Factor .. .. .	13,200	13,500	31,430	88,900	92	—
Epicure .. .. .	3,630	41,980	1,650	30,771	—	780
Northern Star .. .. .	1,650	7,860	2,080	53,700	1,320	—
British Queen .. .. .	3,960	10,140	5,000	9,996	—	—
Kidney (Canary Islands) .. .. .	54,250	—	10,500	22,500	—	—
King Edward .. .. .	—	—	100	35,540	—	—
Prosperity .. .. .	—	118,800	3,300	—	—	—
Scottish Triumph .. .. .	2,000	—	9,900	15,000	—	—
Langworthy .. .. .	2,640	—	100	4,000	—	—
President .. .. .	—	—	3,300	129,400	—	—
Duke of York .. .. .	—	—	41,300	19,800	—	—
Five Towers .. .. .	—	—	62,700	1,000	—	—
Evergood .. .. .	3,960	—	—	5,100	—	—
Dalhousie .. .. .	—	—	3,800	7,000	—	—
Rosette .. .. .	1,000	—	3,000	9,600	—	—
Heavyweight .. .. .	—	—	10,000	20,000	2,400	—
King of Potatoes .. .. .	—	—	6,000	3,300	200	—
Star of Reading .. .. .	—	—	4,000	3,600	400	—
Early Wonder .. .. .	—	—	—	20,000	300	—
John Bull .. .. .	—	—	—	2,244	660	—
King of Earlier .. .. .	—	—	1,650	200	—	—

There were also imported for seed purposes through Cape Town 5,160 lbs. of Jersey Flake; through Port Elizabeth, 2,500 lbs. Scottish Queen; through



East London, 25,000 lbs. Red Skin Flour Ball, 13,200 lbs. German Blues, 2,500 lbs. Scottish Champion, 1,650 lbs. Midlothian, 600 lbs. Empress, 500 lbs. Caledonia, and less of three other varieties; through Durban, 22,200 lbs. May Queen, 21,000 lbs. Flour Ball, 16,400 lbs. Sharp's Express, 8,400 lbs. Eclipse, 7,500 lbs. Institut de Beaunais, 6,400 lbs. Monster, 4,600 lbs. Ninety-fold, 4,500 lbs. Templar, 4,488 lbs. Superb, 3,775 lbs. Reading Giant, 2,600 lbs. Cottar, 2,544 lbs. Duchess of Cornwall, 2,500 lbs. Main Crop, 2,500 lbs. Defiance, 2,244 lbs. Treasure, 2,244 lbs. Wonder, 2,200 lbs. Royal Kidney, 2,000 lbs. Clouseburn Castle, 1,000 lbs. Crouner, 1,000 lbs. Barnet, 600 lbs. Sir John Llewellyn, 560 lbs. Arran Chief, and 100 lbs. to 300 lbs. of sixteen other varieties; and through Mossel Bay, 9,900 lbs. Magnum Bonum, 6,600 lbs. Prof. Wohltman, 2,600 lbs. Challenge, 2,100 lbs. Conquest, 660 lbs. White Kidney, and smaller quantities of sixteen other varieties.

Of the remaining potatoes, 279,176 lbs. were table potatoes from British East Africa, and 239,484 lbs. chiefly seed potatoes of British origin that were not named on the containers or in the documents submitted to the Plant Inspectors.

The potatoes were exceptionally free of decay and serious blemishes, as the next table, based on the inspection of the contents of five *per cent.* of the packages, clearly indicates. Tubers showing any trace of decay are classed in the first division, those showing scab but no decay in the second, and so on. Thus no tuber is counted for two classes:

Percentage of tubers affected with	Cape Town.	Durban.	Port Elizabeth.	East London.
Fusarium and other decays ..	2.04	2.03	2.05	2.17
Oospora and other scabs ..	1.04	4.47	2.97	4.88
Rhizoctonia .. .. .	.44	.07	6.38	3.44
Insect tunnellings .. ..	.63	.23	2.00	4.61

It should be remembered that the potatoes are examined after being packed three weeks or longer and after they have endured a voyage through the tropics. The Root Gall Worm (*Heterodera*), so common in South African-grown potatoes, is not noticed in the potatoes from Europe.

A total of 2,623 packages, containing 204,045 lbs. potatoes, were rejected on account of the presence of *Bacillus phytophthorus* decay or other pathogenic bacterial disease. The packages were taken from 21 consignments.

The fee for fumigation rarely varied from 6d. per package and brought in a revenue of £4,776 7s. 2d. About one and three-quarter tons of formaldehyd solution and half this weight of permanganate of potash were used. The quantities were somewhat greater, relatively, than in the previous year, owing to more space being left around the cases. The proportion works out at about 1 lb. of formaldehyd to two tons (about 70 bushels) of potatoes. Three pounds are regularly used to 1,000 cubic feet of chamber space. The period of exposure varies from 4 to 15 hours.

*Codling Moth Regulations.*—To retard the spread of the Codling Moth it is prohibited that apple, pear and quince fruits be removed into certain extensive areas of the Union where the pest is not yet known and where it is thought these fruits might be profitably grown on a commercial scale. The only alteration in the regulations made during the year reviewed was the removal of the districts of Barkly East and Alexandria from the closed areas, the step being taken at the request of public bodies in the two districts. In both cases the privilege of getting fruit from infested parts of the country was deemed more advantageous than protection from the pest. Undoubtedly, numerous small lots of the prohibited fruits are taken into the closed areas in defiance of the regulations or in ignorance of them, but on the whole the traffic is trifling compared with what it would be were it not for the prohibition. Every infringement that comes to the notice of the Division is reported to the magistrate in the districts concerned, and the Railway and Postal Departments are notified of any delinquency on the part of their officers. Twenty-seven infringements were reported to magistrates during the year. In most instances the charge against the offending party was dropped after he had been warned or reprimanded, but in at least five cases a fine was imposed.

Various steps have been taken to acquaint the public with the restrictions. Chief amongst these during the past year was the publication of a large poster, of which 2,000 copies were distributed through the Publicity Department to railway stations for display. The poster gave concise information on the subject and showed what sections of railway were in the closed areas. Railway servants were made acquainted with the regulations by special instructions from the General Manager of Railways, in which they were directed to give effect to the restrictions by declining to forward consignments of the fruits in question when addressed to a station in a closed area and by detaining at the destination station any that were inadvertently forwarded. Johannesburg is the chief market from which a large part of the closed territory is supplied with fruit, and wrongful shipments from there are guarded against by the Plant Inspector there stationed, he regularly inspecting the consignment notes for outgoing fruit.

*Plant Remoral Regulations.*—The regulation requiring that railway and postal officials refer sendings of plants to a Plant Inspector for examination if despatch direct to the addressee is not authorised by certificate or special permit, remained unaltered during the year. Public attention was drawn to it by a notice in the leading newspapers, by information published in the official *Post Office Guide*, and by the railway poster alluded to in the preceding paragraph, while railway and postal servants were officially notified by their respective departments, but I feel no doubt that the requirement is frequently disregarded. In all, 816 consignments are recorded to have been stopped in transit and examined. The lists of injurious insects found on the plants includes eight common species of scale, Woolly Aphis and several other species of aphides, Citrous Psylla, and Root Gall Worm. It is quite evident that the interchange of plants by private parties is prolific in rapidly disseminating pests that naturally spread very slowly, but the spread by this agency is principally from garden to garden, not to commercial orchards and plantations, and hence lacks much of the importance of spread by nursery stock.

*Regulations Relative to Bees.*—Private parties are not allowed to introduce bees, and no introduction by the Government has been made or requested since the present legislation went into force on 1st April, 1912. Beeswax and foundation comb continues to be admitted under permit. White wax is admitted without any stipulation relative to disinfection, but the supplier of foundation comb must give a sworn certification that it was prepared from wax kept heated to 212° F. for two and a half hours, and any permit for yellow wax is made conditional on a similar certification or on the wax being subjected to such heating on arrival. Only in rare instances does an importer fail to get the certification from the supplier, and its procural seems not to be at all a serious obstacle to the beeswax trade in most of its branches. The wax from the larger markets does not show by its colour that it has been subjected to heat, and the inspectors are not in a position to ascertain whether the certificates are false or whether the wax has been bleached after heating. Fortunately it is doubtful that the wax is a source of danger with respect to bee diseases, and the necessity for the certification probably at least ensures that no wax that has not undergone considerable refining treatment is introduced. It is quite probable, however, that the requirement handicaps the preparation of floor and furniture polish by manufacturers in this country by excluding crude wax that would otherwise be obtained from Madagascar and other direct sources of supply. The permits issued during the year, with those issued during the preceding year for comparison, were:—

		1913-1914.	1912-1913.
Beeswax	.. ..	77 permits for total of 8,610 lbs.	65 permits for total of 8,357 lbs.
Foundation comb	..	25 permits for total of 2,045 lbs.	46 permits for total of 3,409 lbs.

*Correspondence and Publications.*—The number of outgoing letters and telegrams to which registration numbers were given at the Pretoria office was 4,767 and 532 respectively. Acknowledgements and letters of a circular nature are not numbered and the figures given represent only about half of the outgoing communications.



The chief contributions of Division officers to the *Union Agricultural Journal* were as follow:—

Title.	Writer.	Issue.	Pages.	Illustrations.
		Vol. V.		
Mally Fruit Fly Remedy .. .. .	C. P. Lounsbury	April ..	570-574	—
Locust Bacterial Disease .. .. .	"	" ..	607-611	—
The Wattle Bagworm .. .. .	Claude Fuller..	June ..	838-855	2 platos and 3 text figures.
Fly Plague (Stomoxys) .. .. .	"	" ..	922-925	—
A New Sugar-Cane Pest .. .. .	"	" ..	931-933	—
		Vol. VI.		
The Wattle Bagworm .. .. .	"	July ..	19-33	—
Insect Notes:				
Locusts; Fruit Moths; Bagrada Bug;	C. P. Lounsbury	" ..	87-92	—
Caradrina exigua; Codling Moth				
Regulations; Nursery Quarantines;				
Fruit Fly Parasites.				
The Wattle Bagworm .. .. .	Claude Fuller..	August	198-215	9 plates.
Peach Tree Aphides .. .. .	C. B. Hardouborg	" ..	224-235	—
Bee Disease at Johannesburg .. ..	C. P. Lounsbury	" ..	233-237	—
Root-Knot, Gallworms and Eelworms ..	Claude Fuller..	Sept. ..	440-448	4 plates and 6 text figures.
		October	792-802	—
Pernicious "Scale: Present Position" ..	C. P. Lounsbury	" ..	662-670	—
		Vol. VII.		
Locust Campaign, Cape Midlands ..	Claude Fuller..	January	30-34	—
Mosquitoes and Malaria .. .. .	J. C. Faure ..	February	223-242	13 text figures.
Ringed Storks in South Africa ..	Claude Fuller..	" ..	326-327	—

*Division Exhibit at Agricultural Shows.*—An entirely new divisional exhibit was prepared during the year and placed on view in charge of one or other of the staff at each of the chief Agricultural Shows in the 1914 season. The new exhibit was designed by Mr. Fuller and executed by Mr. Kelly, a month or more being consumed in its preparation. It consists of 25 glass-faced, strongly-made wooden cases, containing a representative collection of injurious insects and their work. Each case is made of a central section 21 inches wide by 27 inches high, to right and left of which is hinged a side section of half the width. The side sections fold over the face of the central one, meeting in the middle line, and thus when the case is closed its glass face is protected, while when it is open it presents to view an exhibit area 42 inches wide by 27 inches high. The material is tastefully mounted on "Riker" boxes firmly fixed behind a sheet of heavy mounting cardboard of a colour harmonising with the cotton background of the boxes and cut about each box so that its contents, but not the box itself, is exposed to view. The effect is decidedly pictorial. The cases pack into five large boxes in such a way that they withstand the shock of transport by train and wagon.

*Locusts.*—As was foreshadowed in the last annual report, an area in the midlands of the Cape Province was overrun by migratory locusts in the spring and summer of the 1913-1914 season. No invading swarm was heralded, and it is suspected that the visitation was a local development from successive generations of locusts that had escaped notice and had lived after the manner of non-migratory grasshoppers. There is a long-standing arrangement in the Cape Province whereby the police patrol stations, in the districts considered liable to locust invasion, report regularly every month to the Division respecting locust conditions. The police are supposed to make enquiries about the pest at every farm visited. Independent of the arrangement for enquiry and report by the police, the Division has in the Cape Province private correspondents, numbering about 500 in all, who are supplied with post card forms, and who are under promise to report at once to the Division the particulars of any occurrence of locusts in their vicinity. The first report of the late outbreak came in April from one of these volunteer post-card reporters, a farmer from a neighbouring district, who chanced to observe the locusts when travelling by train. A police report and post-card reports from other farmers soon followed. Specimens were kindly caught and sent to the Division by the police and private parties, and these bore out the statement made by several observers that true locusts were mingled with grasshoppers. The locusts, moreover, were not clearly the common migratory locust (*Locusta pardalina*) and were suspected at first to be of the species known as *Locusta danica*, but it is now thought that they, or at least the swarms with which we later had to deal, were the true *L. pardalina* with some admixture of a green-marked variety of the same species. The swarms



seen in April and May were scattered over a triangular area around Doornberg Mountain, with Middelburg, Schoombie and Fish River as the three corners. Their importance lay in the probability that eggs laid by them would give rise to a visitation of voetgangers after the first good rains in spring.

Sections 16-20 of the *Agricultural Pests Act*, 1911, deals with the locust problem. The Act imposes on occupiers the duty of reporting the laying of eggs or the appearance of voetgangers on their property and the duty of destroying the voetgangers immediately. These obligations were notified by newspaper advertisement during the early winter and also in a circular distributed by the police to farmers throughout the area where it was suspected that voetgangers might appear. Further, the officers in charge of the various police patrol stations over a large part of the Province were informed that locusts had re-appeared, and requested to see that particular attention was given to acquiring information. These steps, however, failed to disclose that an outbreak of serious importance was imminent, the pest being reported as having been seen on only sixteen farms and as having laid eggs on only nine, and on them not extensively; but the great size of the farms in the area, the distance of the infested farms from one another, the unobtrusive development of the swarm or swarms that had been noticed, and the confusion of locusts with grasshoppers, led the Division to fear an outbreak of much greater magnitude than the direct evidence appeared to indicate. The writer attended a meeting of the Midland Farmers' Association, held at Middelburg on June 10th, for the discussion of the situation, and appealed for the active co-operation of the farmers in getting the voetgangers destroyed without delay as soon as they appeared. It was the general opinion then that koorhaans and other birds would scratch out and devour most if not all of the eggs during the winter. But arrangements were made with the police for each patrol station in the suspected area to be a depot for the issue of locust destruction materials; and in September what at that time seemed an altogether excessive supply of prepared poison and pumps was sent to each of these. Further, it was arranged that Mr. R. O. Wahl, the lecturer in Entomology at the School of Agriculture, Middelburg, should visit the infested and suspected farms first to explain the regulations and to inform the farmers how the materials supplied for the destruction of the voetgangers should be employed, and later to see that the regulations were being observed, and in general to act as "locust officer" for the department.

The hatching began 5th October, but it was several weeks before it was complete even on individual farms. Instead of the pest proving to be nearly exterminated by birds and confined to nine farms it appeared in truly enormous numbers and on about ninety farms. The farms in the area are large, some of them being from 10,000 to 20,000 acres in extent, but they consist largely of treeless plains and mountain land, and are occupied by a highly intelligent and on the whole prosperous class of farmer; and hence the wholly unexpected magnitude of the hatching illustrates strikingly how well nigh impracticable it may be sometimes to gauge in advance the extent of a threatened outbreak of locusts almost anywhere in the Union. It is commonly claimed that there is no excuse for a farmer not knowing when locusts visit his farm and knowing where and to what extent they lay eggs, but it is evident in the present instance that the pest must have been numerous on many farms during the season 1912-1913 without the occupiers becoming aware of its presence. There is a story told that on a previous occasion voetgangers appeared unexpectedly and in great numbers in the vicinity of the Doornberg after locusts had been absent for an interval of fourteen years, and a similar story is told about an extensive outbreak that occurred in the early nineties near Graaff-Reinet. The commonly accepted explanation for such occurrences is that the eggs must have laid in the ground throughout the long interval; but while the writer has proved that eggs if kept dry may retain their vitality for a period of three and a half years, there is no sound reason for suspecting that eggs would remain unhatched for years over an extensive area under the rainfall conditions that prevail in the midland districts of the Cape. It is much more probable that the outbreaks are due to an unobserved multiplication of the pest through a series of years, but if this explanation is the correct one it should be possible to collect locally-bred specimens of the pest in the Karroo and Midland Districts in years when locusts are regarded as absent from these regions.

Mr. Wahl worked energetically and to good effect, and despite the extensiveness of the outbreak apparent to him at the end of October he was still hopeful that all the swarms would be found and destroyed. But a few days

later it became clear that he needed assistance urgently, and during the first week of November Mr. Thomsen was sent from Pretoria to work with him, and an additional locust officer was engaged through the Magistrate at Steynsburg. Mr. Thomsen, in 1905, joined the Transvaal Division of Entomology as a locust officer, and as he took a leading part in all the locust campaigns conducted in the Transvaal from that year onward he was well qualified by experience for the work in the Cape. Further supplies of poison and pumps were hurried into the infested area. Owing to a heavy demand for poison not having been anticipated, no steps had been taken to augment the reserve supply of about 2,000 gallons, which the Government had on hand, and for a brief while it was feared that the supply would prove insufficient. Fortunately there was no shortage.

The poison issued was in iron drums each containing 5 lbs. of arsenite of soda dissolved in a half gallon of water and blended with one gallon of molasses or an equivalent quantity of dissolved sugar. The directions state that one measure of the poison should be diluted with 50-66 measures of water, and when diluted to this extent the mixture is really very strong for its purpose and far stronger than similar preparations are recommended for use in oversea countries. Properly diluted, therefore, the supply of poison was ample to make 100,000 gallons (imperial) of liquid for spraying vegetation or for mixing with bran or other baiting material. It became a common practice, however, to dilute the concentrated poison with only 15 parts of water and to use the preparation to drench the *voetgangers* while they were clustered. This procedure has the advantage of killing them more quickly than that of spraying surrounding vegetation, and is claimed to answer when spraying and baiting with the poison is more or less unsatisfactory through disinclination of the insects to feed. The increased danger to stock through the use of the stronger solution is largely offset by the more thorough withering of the vegetation, and there seems no doubt that the drenching system is commendable at times, particularly when the *voetgangers* are newly hatched. There were frequent complaints that both ordinary spraying and baiting with the recommended strength of the poison was ineffective, and it got to be a common belief that the concentrated mixture varied greatly in strength. In consequence, the Government was severely criticised. But the poison was all of the specified strength, the method of preparing and mixing the ingredients having amply guarded against variation, and the differences in its action must be attributed to sundry faults or oversights in its employment. Whether the insects take it greedily or not depends on numerous circumstances. Baits no doubt often lack in attractiveness compared with sweet grass and are passed by even when additional sweetening is incorporated in them; and while when the veld is in poor condition it may not seem to matter what the bait consists of or whether it is put down at night or morning, at other times it seems necessary to use succulent sweet grass and to put it out in the early morning. Couch grass, barley, wheat and oats are said to be preferred in the order named.

The pumps issued were Deming "Success" bucket pumps fitted with Bordeaux nozzles. They were loaned to the farmers, while the poison was given without charge in accordance with a provision of the Act. The collection of pumps issued on loan in this campaign as in previous ones is involving an immense amount of trouble in comparison with the value of the pumps, and it would probably prove a cheaper and better plan to issue pumps only on condition that they are paid for even if the charge made is only half or two-thirds the ordinary shop prices for the article. The sales could be restricted to parties known to have locusts on their properties, and adequate precautions taken to prevent abuse of the system.

Most farmers worked well, but there were some delinquents even amongst the most prominent and, doubtless owing in part to the unexpectedness of the outbreak on their properties, many failed to take the work of destruction in hand until the insects were a month or more old. Little damage of consequence was done by the *voetgangers*, and the farmers lacked the powerful incentive to action that would have been present had they had extensive sowings to protect. The area is a pastoral one,—and lucerne, which is little attacked by the brown locust, is the only cultivated plant grown on a large scale. Moreover, instead of being congregated in a few large and easily found swarms, the *voetgangers* often were present in numerous small and widely scattered clusters, many of which were overlooked by the farmers; and because there was an abundance of sweet grass spraying and baiting did not always yield the desired results. These conditions in connection with a shortage of labour led to the outcome of the



work on some farms being far from perfect. Then locust birds and other natural enemies of the pest were remarkably scarce. But notwithstanding all the difficulties and deterrents, and the indisputable facts that more thorough measures could and should have been taken by some of the farmers, and that at times there were shortages of poison at some depots, it is estimated that about ninety per cent. of the voetgangers were prevented from maturing. A higher degree of success had never been achieved in any previous locust campaign of as great a magnitude in South Africa. Had it not been for the destruction measures it is certain that a prodigious extent of the country would have become infested by the succeeding generation of the pest and that 1914 would have had to go down in history as one of the great locust years. The outlook would doubtless have been fully as black as was that for 1907, the last year when an enormous area suffered from a visitation. Too much credit cannot be given to Mr. Wahl for the part he played in the campaign, and that a small proportion of the insects escaped destruction was no fault of his. The extremely long hours he worked and the incessant strain and worry would quickly have disabled one not gifted with his exceptional physique and ability. Incidentally, he did most of his travelling by motor bicycle, thus getting from farm to farm with least loss of time, and in the eight weeks of the campaign he covered over a thousand miles in this manner.

It may here be mentioned that an effort was made by Mr. Thomsen to utilise d'Herelle's *Coccobacillus acridiorum* against the locusts. This organism has been claimed to give good results in the Argentine, cultures sprayed on vegetation when eaten being said to start a fatal disease which spreads rapidly. Although experience led this Division to expect failure it was thought advisable to make a test. A culture was intensified in virulence by passing it through six series of newly-fledged locusts. The first series took about twenty-four hours to die, but the sixth only about six hours. Then, following d'Herelle's instructions, an infected bouillon was prepared, and after 24 hours sprayed over vegetation on which a swarm of voetgangers were feeding. If any infection of the insects resulted it escaped observation, and other pressing duties did not admit of Mr. Thomsen taking time to continue with this line of work in view of the apparent utter improbability of success. The heat and intense dryness and other factors of the situation made it seem incredible that a disease of this character spreads sufficiently to be an adequate return for the labour and expenditure involved in keeping it going.

Winged locusts were first reported on the 12th November, less than six weeks after voetgangers were first observed, and by the end of November most of the insects that had escaped destruction had taken to flight. Some of the swarms that formed circled about in the area where they were bred and never spread to a distance; but others, about the 1st of December, separated and rapidly migrated north-eastwards. Throughout the month of December the latter swarms were reported from numerous places. They were apparently five in number. Two penetrated into the south-central part of the Transvaal, about 400 miles in an air line from where they originated. One disappeared into Basutoland, and one was last heard of in the west-central part of Natal, north-east of Ladysmith. These swarms were followed and much harassed by locust birds, and their ultimate extermination appears to have been effected chiefly by this agency. After December 31st they were no longer reported. They encompassed about 80,000 square miles of territory in their migrations, and, not unnaturally, because observed over so extensive an area, they excited newspaper comment unfavourable to the Government. But they were not really large swarms, and their importance was not commensurate with the distance they travelled for the drought-stricken condition of the Orange Free State and their being pursued by birds must have hastened and extended their migration. The Division went to much trouble to keep track of their movements and wrote numerous direct enquiries to farmers and others in its endeavour to learn if any egg-laying took place; but no egg-laying at all was reported, and it is probable that none occurred in the Union, as by the time when it was likely to begin the locusts had died out. Yet there is a fear that scattered individuals may have survived after the swarms moved on and disappeared, and that these may have oviposited and that here and there vital eggs may now be in the ground. Owing to the drought in the region concerned, hatching might not have occurred during the summer.

The swarms that remained in and about the area where they were bred laid eggs in January. Egg-laying by the brown locust at this time of the year was contrary to all previous experience in the knowledge of the Division, as was also the occurrence of a second generation of the insect, as soon followed. That



two generations of the species is normal has been stated to be the case (see p. 29, 1st Report of South African Central Locust Bureau), but not, so far as is known to me, on the basis of observation. The egg-laying on this occasion occurred on a few farms scattered about the area that had been infested by the first generation of voetgangers and much more abundantly over a smaller extent of adjacent territory to the eastward. The eggs began to hatch early in the first week of February, and large later hatchings continued to be reported up to the 24th of the month. The infested territory was soon found to comprise a block of country about 1,800 square miles in extent and to consist of a large part of the Hofmeyr District and parts of the Middelburg, Steynsburg and Molteno Districts. Altogether 134 farms were reported to be infested, and on these 768 swarms, large and small, were destroyed. Although spread over a somewhat greater superficial area the infestation was not nearly so intense on the whole as in the case of the first generation. It seems to me probable that there were not half as many insects, but it should be added that Mr. Thomsen thinks there were quite as many if not more. The Cape Entomologist, Mr. Mally, visited the infested area and made preparation for a campaign against the second generation. Mr. Wahl's services were not available after the first campaign, and when the time approached for the second Mr. Thomsen was sent from Pretoria to represent the Division in the area. Two local men were appointed as locust officers to assist him. The farmers and the Government alike profited by the experience with the first generation in the fight against the second, and most of the swarms were eradicated without procrastination, although not without a great amount of strenuous work on the part of Mr. Thomsen and his assistants. The magistrates and the police rendered invaluable assistance, and the use of motor transport by Mr. Thomsen was of great advantage. On April 1st Mr. Thomsen was able to make the proud announcement that the last known swarm had been wiped out. There is reason to suspect that scattered individuals escaped and reached maturity, but not a single valid report of winged locusts in the area has since reached the Division. The infestation of the Hofmeyr District was reported by Mr. Thomsen to have been as intense as that of any Transvaal District in any year since he became officially associated with locust destruction in 1905, and his achievement in getting every swarm destroyed demonstrates conclusively that extensive havoc by locusts can be confined to that caused by migrant winged swarms from unsettled regions. The national character of locust destruction work is forcibly illustrated by this year's experience. It would not have mattered very much to most of the farmers in the affected area, at least in the present year, had the pest not been combated; but had it not been for the destruction measures it is quite probable that the country from East London to Uitenhage northward far into the Transvaal would be faced with a plague of locusts in the 1914-1915 season.

The Division has replenished its store of prepared poison and overhauled its supply of pumps and is now better equipped for an emergency than it was last year.

*South African Central Locust Bureau.*—As successor to the Locust Bureau the Division keeps in communication respecting locust matters with the Governments of Basutoland, Bechuanaland Protectorate, Swaziland, Southern Rhodesia, Northern Rhodesia, Portuguese East Africa, Chartered Company of Mozambique, Nyasaland, German South-West Africa and German East Africa. With the exception of those of Basutoland and German East Africa these various Governments reported their territories to have been free of migratory locusts in 1913-1914. Basutoland reported the entrance from the Union of the swarm of the brown locust that in a preceding paragraph it was stated disappeared into the territory in December. The advice mentions that wherever the swarm alighted at night it was attacked by natives, who gathered the insects for food, and the extermination of the swarm is attributed to this action. No egg-laying was observed. German East Africa reported that a number of winged swarms, both large and small, of *Schistocerca peregrina* appeared in the north-eastern part of its territory during November and December, 1913. As a rule the flight was from the mountains towards the plains, and the swarms spent little time in inhabited sections of the country. In February, 1914, very large new swarms were reported in the Districts of Kondoa-Irangi and Dodoma, thus indicating that extensive breeding had taken place. Most of the places where the pest was reported lie between the northern border of the territory and the railway line extending inland from Daressalam, and the few exceptions lie only a short distance south of the railway. The natives at one place were reported to eat the locust, and it was thought likely that the natives throughout the territory

[U.G. 2—'15.]

ate it customarily. In South Africa the Red Locust is not relished by the natives and is rarely eaten. Although known to the Germans by a different name, this East African locust is not unlikely identical with our Red Locust (*Cyrtocanthacris septemfasciata*).

It should be added that under date of 27th February the Agricultural Office at Maseru, Basutoland, sent to the Division a few specimens of locusts from a small swarm that had recently passed near Maseru flying in the direction of the Orange Free State. The specimens proved to be of the Brown Locust and they were so fresh in appearance that it is thought they were progeny from the swarm that entered Basutoland early in December. The Basutoland authorities made enquiries, but failed to get any further information of the swarm, and no other report of it came from any source. The incident strengthens the suspicion that December swarms may have laid eggs despite their early extermination and the fact that no laying was anywhere observed.

*Pernicious Scale (Aspidiotus perniciosus).*—The prominence given to this insect in the last two annual reports prompts me to make special mention of it in this one, and it is a pleasure to be able to record that in and around Pretoria at least the insect decreased very remarkably during the year. There is no doubt in my mind that the decrease is chiefly attributable to the character of the season, particularly with respect to rainfall. A general inspection has not been made, but many representative places have been visited for the special purpose of observing the status of the insect, and at none of these was the insect found to be nearly as prevalent as the year before. At some places where the insect was found in 1911 it is now difficult to demonstrate the presence of any living specimens, and this even where no suppressive action has been taken. If it were to be judged by present conditions one would be justified in stating that the pest is quite a negligible one; but from the conditions of previous years and from its variation in numbers in different localities now, I infer that its present set-back will prove temporary, and I should not be surprised if before another year passed it regained its lost ground and again showed itself to be a grave menace. While it appears nowhere to have multiplied as it did in the two previous years, its abundance now appears to be in direct relation to the recent growth made by the tree, it being in greatest numbers on the relatively well-watered and well-cultivated trees. Fruit trees around Pretoria, taken as a whole, bore a fair quantity and quality of fruit last season, but they made very little growth even in the best kept gardens. The conditions of the previous year were also unpropitious for wood growth, and the set-back to the scale that is now so pronounced showed clearly a year ago in the parts where the soil and water factors are least favourable. Comment on the declining state of the scale in certain suburbs was made in last year's report. The conditions that have adversely affected Pernicious Scale are doubtless also responsible for a very marked decline observable in the abundance of the Grey Scale (*Aspidiotus africanus*), a closely related species; but the number of the common Red Scale (*Chrysomphalus aurantii*), Ross Scale (*Aspidiotus rossi*) and the White Peach Scale (*Aulacaspis pentagona*) appear to be affected in less degree.

Despite of the general decrease in its abundance and of all the spraying that has been done, the Pernicious Scale has been slowly spreading in Pretoria and no doubt elsewhere. A slight occurrence in a Pretoria nursery was found late in August, but this was at once suppressed and no trace of infestation has since been found there nor has the insect been discovered in any other nursery. The outbreak appeared to be confined to five tinne'd fruit trees that had been in the premises for two years or more. The infested trees were destroyed, the remaining small stock of fruit twice fumigated and isolated, and the near by permanent susceptible plants cut down and burned. The source of the infestation is a mystery. Only one of the trees was much infested, and it is thought that a very few scales must have been introduced with this tree. The tree is claimed by the nurserymen to have come from a certain Natal nursery, but that nursery is far away from where any occurrence of the scale has been found, and the grafting of the tree was at a height quite different to the height followed there. An occurrence of the scale at Weenen, Natal, a place not previously known to be infested, has come to light, but how it originated is still in doubt. The prevalence of the pest at Estcourt, however, prevents any surprise at its having reached Weenen.

The action taken to secure action against the scale in the winter of 1913 was recorded in last year's report. In July of this year, that is subsequent to the period supposed to be covered by this report, an article by the writer again directing attention to the pest and urging thorough spraying of the trees where



it has been found to occur, was published in the several Pretoria newspapers; and a month earlier the local authorities in all the towns where there were outbreaks were urged by letter to do what they could to secure efficient action in their respective areas. The Superintendent of Parks, Johannesburg, has again had the infested and suspected premises in Johannesburg sprayed, at the public expense. Standerton has secured a bye-law under which owners may be required to suppress the pest, but it remains to be seen if any effective use is made of this measure. As in 1912 and 1913, the Town Council of Standerton has undertaken to spray trees at cost for residents. The authorities of Pretoria were specially urged in July, 1913, to consider control measures, but have taken no decisive action. The memorandum on the subject submitted for the information of the Council embraced a detailed tabular report on the 145 properties where the insect had been found at the original inspection, and listed the 82 others to which we knew it to have subsequently spread.

The special inspection of plants to be sent away from Pretoria, whether by nurserymen or others, has been kept up, and as in the previous year the precautionary fumigation of all food plants of the scale has always been required. Not once during the year was any trace of the scale found on any plants that it was proposed to send away.

#### INVESTIGATIONS BY CAPE ENTOMOLOGIST.

The work of the Cape Branch was severely handicapped during the year by lack of assistance. Mr. Mally, who is in charge, is supposed to be supported by one technically-qualified assistant and one qualified to an extent by experience, but the post for the higher qualified officer was vacant until January, 1914, when it was filled by the transfer of Mr. Van der Merwe from Pretoria. The branch was called on during the period reviewed for considerable assistance in the inspection of nurseries, in connection with the outbreak of locusts, and in other lines of routine and administrative work; but good progress was made on economic investigations of the Maize Stalk Borer (*Sesamia fusca*) and Black Beetle (*Heteronychus arator*) and several other insects. The Cigarette Beetle, Lucerne Tylenchus, Eucalyptus Borer (*Phoracantha recurra*) and a destructive tree cricket also had a large share of attention, as the publication of results in the *Agricultural Journal* will show. For several years past there has been a gradually increasing loss by mealy bug attack in citrous orchards and in vineyards, and to a less extent in pear orchards in the Cape, Stellenbosch and Paarl Districts; and the persistent demands from the fruit growers for improved methods of combating this pest has made it necessary for Mr. Mally to give this subject prominence. His efforts have been rewarded with much more success than was anticipated, as mealy bugs are extraordinarily difficult to combat. The work is still being prosecuted, but a valuable report on it will soon be forthcoming. Measures for the suppression of the Argentine ant, and the house fly have also had and are still having attention. Little advance has yet been made in means for controlling the ant, but an adaptation of the so-called 'Mally fruit fly remedy' is giving promise of proving a highly important addition to our agents for suppressing the fly. Incidental to this work a true parasite of the house fly was discovered by Mr. Mally to exist at the Cape. Material of this parasite (*Muscidifurax vorax* Girault) was given by Mr. Mally to Prof. F. Silvestri when the latter was in South Africa late in March, 1913, on a search for Fruit Fly parasites. Silvestri carried the insect to the Hawaiian Islands, and there it has been successfully colonised, and is expected to prove of much value against the very harmful Horn Fly. It is a tiny four-winged fly that passes through its entire life cycle in two to three weeks.

Silvestri, it may be here recorded, was given all possible assistance during his stay in South Africa. His visit lasted only three weeks, but during this time he was almost constantly attended by Mr. Mally or some other member of the staff. He left the Division material of several species of Fruit Fly parasites which he had discovered in West Africa, but unfortunately neither Mr. Mally nor the staff at Pretoria succeeded in breeding any of the species through the past winter. It is thought that the South African conditions are not sufficiently tropical for them. At the Cape, Silvestri found that the Fruit Fly was attacked by two native parasites, *Opius humilis* Silv. and *Trichopria capensis* Kieffer, and these he took with him to Hawaii. The latter died out altogether, but the former seems to have become established in its new country. It is quite possible that these parasites are now restricted in their distribution in South Africa, and hence their discovery may be turned to our advantage.



The Queensland Prickly Pear Commission was in South Africa throughout April, 1913, and was given much assistance both by the Cape Entomologist and the Pretoria staff. It kindly donated to the Division living material of *Coccus indicus* Green, a kind of cochineal insect that attacks and positively destroys *Opuntia monacantha*, one of the several kinds of prickly pear that have become widespread in South Africa. Some of the material was placed by the Division with Dr. E. Warren, Curator of the Natal Museum, Pietermaritzburg, for breeding and colonisation, and the outcome of this action is told by Dr. Warren in an article published in the *Agricultural Journal* for March, 1914. Mr. Mally has worked independently with the insect and has carried it through generation after generation at his Laboratory and Field Station, Rosebank, near Cape Town. He has demonstrated that monacantha prickly pear succumbs to its attack, while it is not able even to develop on the ordinary doornblad and kaalblad species. The ordinary doornblad has a value as stock food in times of drought, but the monacantha is a quite worthless species.

*Wattle Insect Investigations.*—Entomologist C. B. Hardenberg spent the year entirely on the investigation of insects injurious to the wattle, the beginning of which was chronicled in last year's report. At first he was without a trained or other white assistant, but from July he has had with him Mr. G. C. Haines, an American Entomologist specially selected for the work. The two officers have been extremely diligent in rearing and studying the many insects that attack the wattle, and at the close of the year had conducted or were conducting 330 separate rearing experiments. An average of 120 received daily attention. Most time is being devoted to the notorious Bagworm; but Mr. Hardenberg has found that over a hundred different species of insects are now habitually or occasionally feeding on the black wattle, and while only about a dozen of these are now regarded as of importance he considers it essential to study them all. Many, he feels sure, are capable of inflicting a great amount of damage, and in his report he cites instances of severe devastation in limited areas by species that have a very wide distribution and are generally regarded as unimportant. Mr. Hardenberg's contract with the Government expires 4th April, 1915, and, owing to accumulated leave that he is to take, he is expected to relinquish his service by the end of the present calendar year if he is not re-engaged. Not being able to ascertain the intentions with respect to him, I am having him prepare an exhaustive report on his investigations up to as late a date as possible, and as this full report will soon be ready I refrain from entering into details on the past year's work at present.

CHAS. P. LOUNSBURY,

Chief. Division of Entomology.

## APPENDIX XI.

## DIVISION OF CHEMISTRY.

ANNUAL REPORT, 1913-14.

Pretoria.

Secretary for Agriculture.

I have the honour to submit herewith my report on the work of this Division during the 12 months from April 1st, 1913, to March 31st, 1914.

## STAFF, ORGANISATION, ETC.

The past year has seen a substantial increase in our staff, which now is as follows:—

Chemist: H. J. Vipond, B.A.

Assistant Chemists: Dr. B. de C. Marchand, B. J. Smit, B.A.

Analytical Assistant: H. F. L. Bischoff.

Office and Laboratory Assistant: F. A. Berning.

This increase in staff enables us to initiate investigational work on soils, fertilisers, etc., whilst it is expected that a good deal of the analytical work performed on behalf of the public will be taken up by the Agricultural Schools.

A further noteworthy occurrence is the introduction of a uniform system of charges for agricultural analyses throughout the Union; the bulk of the work having previously been performed *gratis*. This tariff, however, only actually came into force at the beginning of the present year—April, 1914.

## PUBLICATIONS.

1. "Results of Manurial Experiments on Maize," published in the *Agricultural Journal* for September, 1913, and also as a Bulletin, No. 3, 1914. This is a summary of three years' results.

2. "The Composition of Crops and Feeding Stuffs," published in abridged form in the *Agricultural Journal* for 1914, and in full as Bulletin No. 1, 1914.

This contains a short explanation of the principles of animal nutrition, a long list of analyses of various crops and feeding stuffs, including all the South African figures available, and finally a series of rations based on Kellner's tables.

## ANALYTICAL WORK.

The following is a list of the samples received and reported on during the year:—

	No. of Samples.
Soils ... ..	247
Fertilisers ... ..	26
Limes and Limestones ... ..	19
Minerals ... ..	3
Waters ... ..	12
Feeding Stuffs ... ..	12
Dips, Insecticides, etc. ... ..	119
Wool ... ..	19
Dairy Products ... ..	21
Miscellaneous Plant Products ... ..	12
Stomachs, Ingesta, etc. ... ..	9
Total ... ..	505

## SOILS.

The policy of carrying out partial analyses in place of the full analysis which used to be made has been continued, and in addition rough reports have been made where a simple physical examination was thought to be sufficient to reveal the character of the soil. This procedure is absolutely essential with a small staff such as ours. The value of a routine chemical analysis is in any case somewhat exaggerated by the ordinary farmer.

The following is a list of the soil work performed on behalf of the public:—

Nature of Work.	No. of Soils.
Rough physical examination only ...	186
Partial Analysis ... ..	82
Full Analysis ... ..	20
"Brak," or other injurious constituents ...	8
Total ...	296

The subjoined tables give the data for all the soils analysed. These include 60 samples of soil and sub-soil from the different Forest Stations in the Transvaal, of which 36 were received during the previous financial year.

*Class I. Soils with good percentages of nitrogen.*

Of these 17 soils nine are from the Forest Station at Graskop and six from the Forest Station at Hanglip. Both of these are situated in the mist belt of the Eastern and North-Eastern Transvaal. They are all sour soils, very deficient in lime and rich in humus, but not particularly dark in colour. This type of soil is common in the high portions of the Drakensberg, Woodbush and Zoutpansberg Mountains. No. 3097 is from the Government Sheep Stud Farm at Ermelo, where the rainfall and elevation are both fairly high. It also is rather deficient in lime. No. 3184 is a heavy black turf from near Rustenburg. It is rich in humus, but comparatively poor in lime.



TABLE I.—ANALYSES OF SOILS.

CLASS I.—Soils with good percentages of nitrogen (i.e. over 150 %)																							CLASS 2.—Soils with good percentages of lime (i.e. 40% and over).			
No. of Soil.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)		
Stones (over ½ in. diam.) Composition of Air-dry Fine Earth :—	2863	2864	2865	2866	2867	2868	2871	2872	2873	2874	2875	2876	2877	2878	2879	3097	3184	2774	2780	2781	2782	3307	3308			
	1st ft.	2nd ft.	3rd ft.	1st ft.	2nd ft.	3rd ft.	1st ft.	2nd ft.	3rd ft.	1st ft.	2nd ft.	3rd ft.	1st ft.	2nd ft.	3rd ft.				1st ft.	2nd ft.	3rd ft.					
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%			
	—	—	—	3.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	2.51	—	—	2.66	—	—	2.96	—	—	5.58	—	—	4.27	—	—	—	—	—	4.97	—	—	—	—			
	10.90	—	—	11.86	—	—	10.88	—	—	17.33	—	—	13.88	—	—	—	—	—	6.46	—	—	—	—			
	57.08	—	—	53.05	—	—	68.48	—	—	45.69	—	—	56.24	—	—	—	—	—	74.04	—	—	—	—			
	28.90	—	—	31.89	—	—	16.79	—	—	30.50	—	—	25.51	—	—	—	—	—	13.19	—	—	—	—			
	Lime ..	..	..	.09	.03	.01	trace	nil	.02	.05	.01	.03	trace	.02	.01	.25	.29	3.30	.90	.77	9.34	.47	.46			
	Magnesia ..	..	..	.11	.11	.08	.26	.08	.09	.11	.07	.50	.11	.31	.22	.34	.36	.28	.26	.82	1.60	—	—			
Potash ..	..	..	.14	.21	—	.51	—	—	.24	—	—	—	.14	—	—	—	.48	.32	—	—	—	—				
Phosphoric Acid ..	..	..	—	.14	—	.06	—	—	.07	—	—	—	.05	—	—	—	.04	.04	—	—	—	—				
Total	..	..	—	99.95	—	—	99.94	—	—	99.57	—	—	100.20	—	—	—	—	—	100.18	—	—	—	—			
Containing :—																										
Nitrogen	..	Subsoil	Subsoil	Subsoil	Subsoil	Subsoil	.204	Subsoil	Subsoil	.291	Subsoil	Subsoil	.236	Subsoil	Subsoil	.160	.188	.118	.119	Subsoil	Subsoil	Subsoil	.143	.160		
Available Potash	..	Subsoil	Subsoil	Subsoil	Subsoil	Subsoil	.0058	Subsoil	Subsoil	.0125	Subsoil	Subsoil	.0112	Subsoil	Subsoil	.0249	.0084	—	.0087	Subsoil	Subsoil	Subsoil	.0420	.0350		
Available Phos. Acid ..	..	Subsoil	Subsoil	Subsoil	Subsoil	Subsoil	.0016	Subsoil	Subsoil	.0014	Subsoil	Subsoil	.0026	Subsoil	Subsoil	.0021	.0054	—	.0008	Subsoil	Subsoil	Subsoil	.0033	.0865		

Stones (over 1/4 in. diam.)  
Composition of Air-dry  
Fine Earth :—

Moisture ..  
Loss on Ignition ..  
Insoluble Matter ..  
Iron Oxide & Alumina ..  
Lime ..  
Magnesia ..  
Potash ..  
Phosphoric Acid ..

Containing :—

Nitrogen ..  
Available Potash ..  
Available Phos. Acid ..

- (1) Dark red heavy loam, Forest Station, Hanglip, Zoutpansberg District.  
(2) Dark red, clayey material, Forest Station, Hanglip, Zoutpansberg District.  
(3) Red clayey material, Forest Station, Hanglip, Zoutpansberg District.  
(4) Dark red, medium loam, Forest Station, Hanglip, Zoutpansberg District.  
(5) Red soil (largely partly-decomposed rock material), Forest Station, Hanglip, Zoutpansberg District.  
(6) Reddish, partly-decomposed rock, Forest Station, Hanglip, Zoutpansberg District.  
(7) Brown medium loam, Forest Station, Graskop, Lydenburg District.  
(8) Yellowish clay soil with some partly-decomposed clayey or shaley rock, Forest Station, Graskop, Lydenburg District.  
(9) Yellowish brown partly-decomposed sandy rock, with some clay and mica, Forest Station, Graskop, Lydenburg District.  
(10) Reddish brown loam, Forest Station, Graskop, Lydenburg District.  
(11) Light reddish brown heavy loam, with a good deal of rock particles, Forest Station, Graskop, Lydenburg District.

- (12) Light reddish brown heavy loam, with lot of rock particles, Forest Station, Graskop, Lydenburg District.  
(13) Brown heavy loam, Forest Station, Graskop, Lydenburg District.  
(14) Light brown heavy soil, Forest Station, Graskop, Lydenburg District.  
(15) Light brown heavy soil, Forest Station, Graskop, Lydenburg District.  
(16) Dark brown heavy loam, Government Sheep Farm, Ermelo.  
(17) Heavy black "turf," Waterkloof 4, Rustenburg District.  
(18) Heavy black "turf," Rietspruit 330, Middelburg District.  
(19) Brown heavy loam, Forest Station, Lichtenburg.  
(20) Brown heavy loam with a lot of grit, Forest Station, Lichtenburg.  
(21) Brown heavy soil with limestone concretions, Forest Station, Lichtenburg.  
(22) Blackish sandy vlei soil, Govt. Tobacco Station, Piet Retief.  
(23) Grey heavy alluvial loam, Govt. Tobacco Station, Piet Retief.







TABLE IV.—ANALYSES OF SOILS—*continued*.CLASS 4.—Medium to Sandy Loams—*continued*.

No. of Soil.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
3046	3047	3048	3049	3050	3051	3079	3080	3098	3152											
1st	2nd	3rd	1st	2nd	3rd															
%	%	%	%	%	%	%	%	%	%											
Stones (over $\frac{1}{8}$ inch in diameter) ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Composition of Air dry Fine Earth :—																				
Moisture ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Loss on Ignition ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Insoluble Matter ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Iron Oxide and Alumina ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lime ..	·09	·12	·11	·05	·17	·13	·30	·04	·08	·06	—	—	—	—	—	—	—	—	—	—
Magnesia ..	·13	·19	·20	·15	·41	·34	·47	·06	·10	·05	—	—	—	—	—	—	—	—	—	—
Potash ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Phosphoric Acid ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Containing :—																				
Nitrogen ..	·092	—	—	·087	—	—	·113	·130	·081	·073	—	—	—	—	—	—	—	—	—	—
Available Potash ..	·0143	—	—	·0104	—	—	·0047	·0062	·0142	·0122	—	—	—	—	—	—	—	—	—	—
Available Phosphoric Acid ..	·0006	—	—	·0006	—	—	·0019	·0011	·0013	·0011	—	—	—	—	—	—	—	—	—	—

- (1) Brown fine-grained light loam, Klipfontein 175, Cedarfont, Standerton District.  
 (2) Brown fine-grained light loam, Klipfontein 175, Cedarfont, Standerton District.  
 (3) Brown fine-grained light loam, Klipfontein 175, Cedarfont, Standerton District.  
 (4) Brown fine-grained sandy loam, Klipfontein 175, Cedarfont, Standerton District.  
 (5) Greyish sandy clay (with decomposing diabase), Klipfontein 175, Cedarfont, Standerton District.  
 (6) Pale, decomposing rock (diabase), Klipfontein 175, Cedarfont, Standerton District.

- (7) Greyish-brown medium loam (alluvial), Barclay's Vlei, Rivulets Siding, Barberton District.  
 (8) Brown gritty loam, Pigeonhole 2334, New Agatha, Zoutpansberg District.  
 (9) Dark red sandy loam, Govt. Sheep Stud Farm, Ermelo.  
 (10) Reddish light to sandy loam, Leeuwfontein 690, on Great Letaba River, Zoutpansberg District.

TABLE V.—ANALYSES OF SOILS—(continued.)

## CLASS 5.—Sandy Soils.

No. of Soil.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
2729	2730	2731	2735	2736	2737	2768	2769	2770	2771	2772	2773	2776	2848	2849	2850	2858	2859	2807	3096	3140	3143	3145	3148	
1st ft.	2nd ft.	3rd ft.	1st ft.	2nd ft.	3rd ft.	1st ft.	2nd ft.	3rd ft.	1st ft.	2nd ft.	3rd ft.		1st ft.	2nd ft.	3rd ft.									
%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
—	—	—	—	—	—	—	—	—	—	—	—	—	1.0	—	—	—	—	—	—	—	—	—	—	
Stones (over $\frac{1}{8}$ in. in diameter) ..																								
Composition of Air-dry Fine Earth :—																								
Moisture ..	0.67	—	0.52	—	—	0.63	—	—	0.79	—	—	—	0.71	—	—	—	—	—	—	—	—	—	—	
Loss on Ignition ..	3.26	—	3.37	—	—	2.53	—	—	2.82	—	—	—	6.25	—	—	—	—	—	—	—	—	—	—	
Insoluble Matter ..	89.15	—	88.03	—	—	93.31	—	—	91.09	—	—	—	85.88	—	—	—	—	—	—	—	—	—	—	
Iron Oxide and Alumina ..	6.47	—	8.15	—	—	3.50	—	—	5.19	—	—	—	6.91	—	—	—	—	—	—	—	—	—	—	
Lime ..	0.04	trace	0.01	0.02	0.02	0.03	0.01	0.02	0.04	0.01	0.01	0.03	0.11	0.03	0.06	0.03	0.01	0.09	0.05	0.17	0.12	0.08	0.04	
Magnesia ..	0.01	0.07	0.04	0.04	0.04	0.04	0.07	0.08	0.11	0.06	0.07	0.05	0.08	0.10	0.12	0.04	0.04	0.08	0.08	0.15	0.09	0.08	0.09	
Potash ..	0.04	—	0.04	—	—	0.04	—	—	0.08	—	—	—	0.05	—	—	—	—	—	—	—	—	—	—	
Phosphoric Acid ..	0.03	—	0.03	—	—	0.03	—	—	0.04	—	—	—	0.04	—	—	—	—	—	—	—	—	—	—	
Total ..	99.67	—	100.30	—	—	100.16	—	—	100.16	—	—	—	100.03	—	—	—	—	—	—	—	—	—	—	
Containing :—																								
Nitrogen ..	0.052	—	0.053	—	—	0.060	—	—	0.053	—	—	0.078	0.085	—	—	0.056	0.035	0.056	0.070	0.095	0.031	0.039	0.020	
Available Potash ..	0.0048	—	0.0079	—	—	0.0092	—	—	0.0084	—	—	0.0070	0.0089	—	—	0.0061	0.0020	0.0162	0.0229	0.0357	0.0316	0.0095	0.0349	
Available Phosphoric Acid ..	0.0008	—	0.0006	—	—	0.0010	—	—	0.0010	—	—	0.0012	0.0005	—	—	0.0005	0.0004	0.0007	0.0030	0.0356	0.0230	0.0028	0.0030	

- (1) Greyish-brown rather fine-grained sandy soil, Forest Station, Pan, Middelburg Dist.  
 (2) Yellowish-brown sandy loam, Forest Station, Pan, Middelburg District.  
 (3) Yellowish sandy loam, Forest Station, Pan, Middelburg District.  
 (4) Dark reddish-brown sandy soil, Forest Station, Pan, Middelburg District.  
 (5) Reddish-brown sandy loam, Forest Station, Pan, Middelburg District.  
 (6) Red sandy loam, Forest Station, Pan, Middelburg District.  
 (7) Light grey sandy soil, Forest Station, Ermelo.  
 (8) Light brown sandy soil, Forest Station, Ermelo.  
 (9) Yellowish-brown sandy soil, Forest Station, Ermelo.  
 (10) Greyish, fine-grained sandy soil, Forest Station, Ermelo.  
 (11) Light brown, fine-grained sandy soil, Forest Station, Ermelo.  
 (12) Yellowish-brown sandy loam, Forest Station, Ermelo.  
 (13) Greyish gravelly soil, Rietfontein 320, Middelburg District.  
 (14) Grey sandy (vlei) soil, Forest Station, Middelkop, Zoutpansberg District.  
 (15) Grey sandy loam, Forest Station, Middelkop, Zoutpansberg District.  
 (16) Greyish sandy loam, Forest Station, Middelkop, Zoutpansberg District.  
 (17) Reddish brown sandy soil, Purekranz 821, Palala, Waterberg.  
 (18) Light reddish-brown sandy soil, Purekranz 821, Palala, Waterberg District.  
 (19) Brownish gritty soil, Rietfontein 57, Bronkhorstspuit, Pretoria District.  
 (20) Grey sandy (vlei) soil, Govt. Stud Sheep Farm, Ermelo.  
 (21–24) Brown, rather fine-grained sandy soils, Lapdoorns, Hoopstad, O.F.S.

Class II.—*Soils containing good percentages of lime.*

These are six in number. No. 2774, from the farm Rietspruit 330, Middelburg District, is a heavy black turf very local in distribution and rich in lime, which occurs in the form of concretions. No. 2780, with the corresponding sub-soil samples Nos. 2781 and 2782, is from the Government Forest Station at Lichtenburg. It is a heavy brown silty soil.

Class III.—*Heavy Soils* (20).

These include 12 samples of soil and 8 samples of sub-soil.

Class IV. *Medium to Sandy Loams* (34).

These include 18 samples of soil and 16 samples of sub-soil.

Class V.—*Sandy Soils* (24).

These include 14 soils and 10 sub-soils.

The average composition of the soils of each class is given in the following table:—

TABLE VI.

	I.		II.		III.		IV.		V.	
	No. of Soils.	%	No. of Soils.	%	No. of Soils.	%	No. of Soils.	%	No. of Soils.	%
Lime .. ..	(7)	·10	(4)	1·28	(12)	·16	(18)	·08	(12)	·06
Magnesia ..	(7)	·20	(2)	·27	(8)	·19	(18)	·11	(12)	·08
Potash .. .	(5)	·25	(2)	·40	(3)	·19	(6)	·12	(5)	·05
Phosphoric Acid	(5)	·09	(2)	·04	(3)	·08	(6)	·06	(5)	·034
Nitrogen .. .	(7)	·209	(4)	·135	(12)	·092	(18)	·096	(12)	·061
“ Available ”										
Potash ..	(7)	·0172	(3)	·0286	(12)	·0129	(18)	·0092	(11)	·0094
“ Available ”			(3)	·0302						
Phos. Acid	(7)	·0024	(2)	·0021	(12)	·0011	(18)	·0011	(11)	·0011

This speaks for itself. Taking the last three groups it will be noticed that there is a regular decrease in the percentages of lime, magnesia, potash and phosphoric acid soluble in strong hydrochloric acid as we pass from the heavier to the lighter soils. On the other hand, if we consider the available phosphoric acid and potash there is not much difference between the heavy and light soils. All five groups appear to contain adequate amounts of available potash for cereal production, but very inadequate amounts of available phosphates, whilst Groups III., IV. and V. also appear to be deficient in nitrogen and are certainly deficient in lime.

We have therefore an all-round deficiency in phosphates, lime and nitrogen, with to a certain degree an all-round sufficiency in potash. These points have all been demonstrated in previous annual reports by the summary of analyses performed during the year.

The soils analysed in this and previous years have been drawn chiefly from the Transvaal, although a few have come from the other Provinces.

I have expressed my opinion that the policy of carrying out analyses of soils for farmers is not a sound one. My reasons are, briefly, as follows: the same amount of work expended on a sample of soil taken in the course of a survey would give very much more useful results; the valuable knowledge which would be gained in the course of such a survey, regarding the source and mode of origin of each soil type, its distribution, range of depth and general capabilities, should claim a great deal of consideration.

Such a survey should be undertaken in different climatic regions at one and the same time since the climatic conditions not only influence the general character of the soil, but also the kind of crops likely to be suitable for cultivation.

The knowledge thus obtained would soon prove itself applicable to a considerably wider area than that actually surveyed, since the same types of soil would be met with from other districts.

As regards the samples which would still be sent in from farmers for advice regarding manurial treatment, etc., a rough examination would have to be made, and thanks to our present knowledge of South African soils we would in many



cases have some knowledge as to the type to which the soil belongs. Certain important factors show a very remarkable uniformity, as can be seen from the tables already given in this report, particularly the amounts of lime and available phosphates, and to some extent also of humus in our soils.

The most important problems to be solved in connection with the soil are:-

- (1) The supply of nitrogen to the plant;
- (2) The potash requirements of various crops.

These are points which call particularly for practical experiments. So far we have been hampered in carrying out field experiments by lack of suitable land and suitable men to carry out the practical side of the work.

We have not yet been able to carry out any pot experiments for lack of the necessary glass houses, etc., for which considerable funds will be required.

We are carrying out some field investigations on the formation of nitrates and the movements of soil moisture in the Koedoespoort heavy red loam.

Other points under investigation are the percentages of humus nitrogen, calcium carbonate and organic carbon in typical soils and also the reaction between the soil and different fertiliser ingredients.

As regards the legacy of the results left by the Pretoria Laboratory from the period before Union, the soil analyses have never been published; in fact it would be of little use to publish them as bare analyses. I have been endeavouring to wade through the old samples and make a rough physical examination of each, but this is a very long and laborious task. About 250 remain to be examined, so that there is very little hope of our being able to publish them for some time to come. Hitherto it must be admitted that this Division has remained somewhat provincial in outlook. This can only be cured by some organisation which will permit of our being brought into contact with farmers in all parts of the Union.

This entails travelling in the first place, but the chief obstacle at present is the difficulty of leaving the office work, there being no qualified clerical assistant attached to the Division. This lack of a responsible clerical assistant is also a serious handicap to our ordinary work.

#### MECHANICAL ANALYSES OF SOILS.

About 40 mechanical analyses of soils have been made during the past year. The first work of this kind was carried out on typical soils belonging to six groups of soils:

- (1) Black turf soils.
- (2) Red and brown heavy loams or clay loams.
- (3) Grey and brownish grey heavy loams to clay loams.
- (4) Red and brown medium to sandy loams.
- (5) Grey and brownish grey medium to sandy loams.
- (6) Sandy soils.

From the rough physical examination that is made of every soil sample sent in to us certain points are brought forcibly to our notice. One of these is the influence of cementing material on the texture of a soil. The important cementing agent in this country is iron oxide. Lime is of comparatively little importance because it is so seldom present in any quantity.

Humus has a considerable influence on the texture of a soil, but this influence depends on the degree of decomposition and on the character of the humus, whether acid or neutral.

The real difference between Groups 2 and 3 is not a matter of colour, this being only an accompaniment of a certain condition. Whereas the typical grey soils break down into a thin mud on standing in water, and on being handled in water are readily reduced to a condition of partial deflocculation the typical red soil breaks down slowly and reluctantly when worked in water, and does not at any time form a thin mud. As intermediate types come, the red and brown alluvial soils, which as a rule break down into a more or less thin mud when stirred in water, but which still resist deflocculation to a greater extent than the grey soils. The typical red soil is of sedentary origin and is derived from older rocks more or less rich in iron oxide.

Soils of this type are hard, the clay particles are in a flocculated condition, and are further bound together by a coating of iron oxide on their surface. When broken up they are much lighter to handle than would be expected from their content of clay.

This brings us to an important question regarding the procedure in carrying out mechanical analysis. Various means are recommended for deflocculating the particles of clay and so attaining a final separation of this fraction from the finest silt. These means include treatment with dilute hydrochloric acid in order to dissolve out lime, the use of ammonia in the water in order to dissolve humus and to maintain deflocculation through the alkaline reaction of the water, and finally pestling with a rubber pestle. The pestle is to be used with discretion so as to avoid grinding the sample, but with soils such as the red sedentary soils referred to it is a very difficult matter to remove the whole of the clay without a fairly vigorous use of the pestle. It is quite obvious that the clay which is held together so strongly will not impart tenacity to a soil to anything like the same extent as when simply flocculated, because the former condition is not broken down by mere contact with an excess of water or even by moderate cultivation when in a moist state, whereas in the latter condition every time the soil gets excessively wet it becomes to some extent deflocculated, and the passage of air into and through the soil is stopped or hindered, whilst the soil takes longer to dry out and become fit for cultivation, which itself requires a lower degree of moisture than in the case of the former soil. In order then to have some compensating standard we have determined the percentage of iron oxide which is extracted from the clay fraction (after moderate ignition) by hot strong hydrochloric acid, the digestion being carried on until the clay is practically white.

This iron oxide may be taken as a measure of the iron oxide behaving as a cementing agent.

In this connection it might be of interest to give some figures as to the relation between the colour of soils and their content of iron oxide (*i.e.*, excluding alumina).

The following table is a summary of the results obtained with 75 soils.

COLOUR OF SOILS.

		Average percentages.		No. of Soil.
		Iron oxide.	Nitrogen.	
(1) <i>Sandy Soils.</i>				
Red and reddish brown	..	3.72	.062	10
Brown and yellowish	..	2.17	.060	10
Grey and brownish grey	..	1.55	.060	9
(2) <i>Medium to Light Soils.</i>				
Red and reddish brown	..	5.75	.072	6
Brown and yellowish	..	5.00	.087	9
Grey and brownish grey	..	1.47	.061	3
(3) <i>Heavy Soils.</i>				
Red and reddish brown	..	13.45	.106	11
Brown and yellowish	..	10.98	.122	9
Grey and brownish grey	..	3.94	.121	8

The nitrogen percentages are a measure of the humus, which exerts a strong modifying influence on the colour of a soil.

The grey soils are very much poorer in iron oxide than the red and brown soils, and the brown soils are as a rule poorer than the red soils except where the humus content is high. The brown in any case is to be regarded as a mixture of red due to iron oxide, and black due to humus.

The percentages of iron oxide in the clay fraction would probably be a better guide, as the iron oxide locked up in the ironstone grains (which are abundant in many soils) cannot have much colouring effect.

The composition of these ironstone ("ouklip") grains was studied in the case of two soils. The "fine gravel," which in each case was chiefly composed of ironstone grains, contained the following:—

No. of Soil.	Percentages in Soil.			Percentages in "fine gravel."	
	Fine gravel.	Phos. oxide.	Alumina.	Iron oxide.	Phos. oxide.
1977 ..	8.80	.04	43.7	26.2	.16
2039 ..	10.80	.06	32.6	36.9	.14

In one case a third, and in the other case a quarter, of the total phosphoric oxide in the soil was locked up in the ironstone grains.

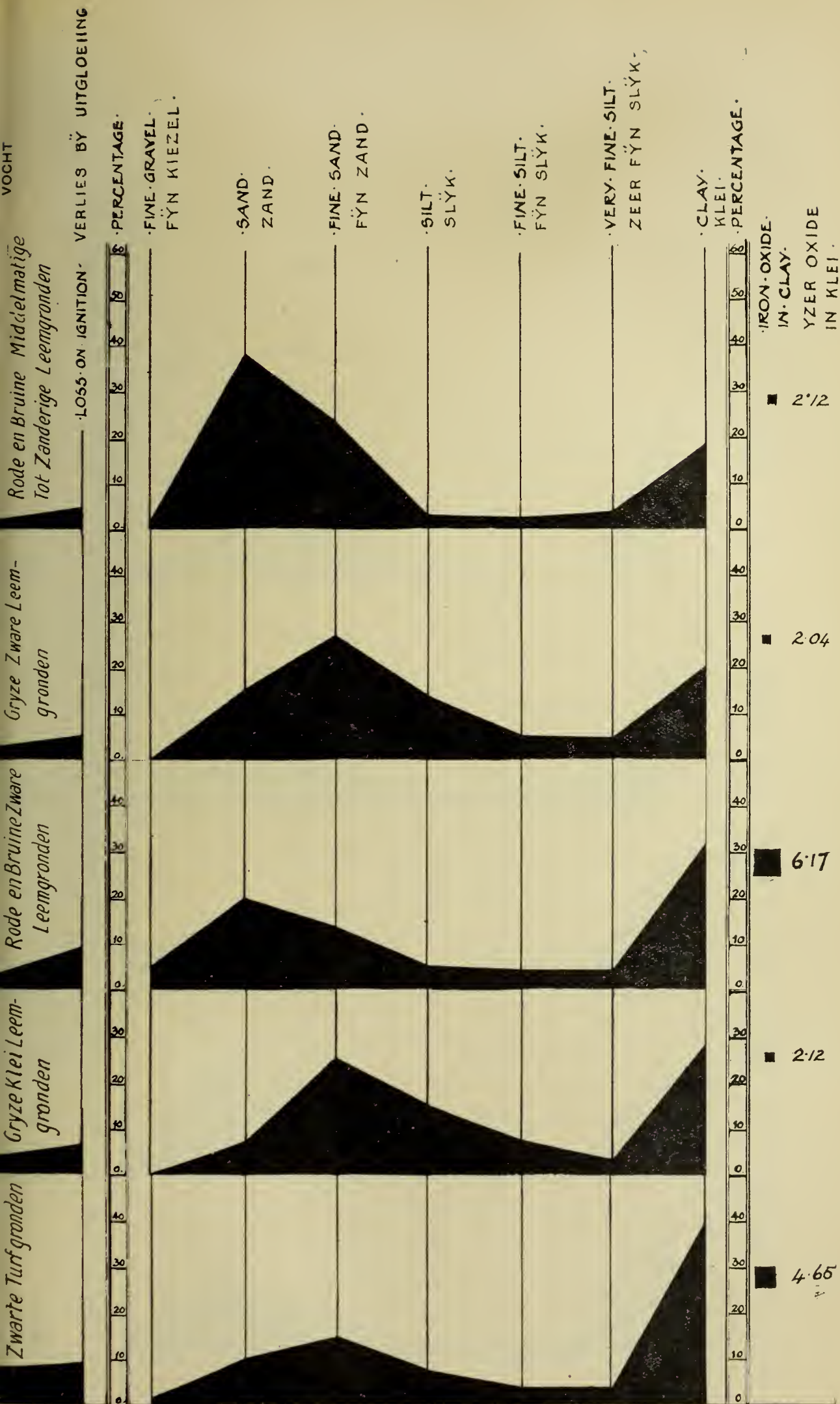
The black turf soils which form the first group are of miscellaneous origin. Some are probably derived from sedentary soils by washing down of the finer particles into low-lying situations. Others are of sedentary origin and are typical soils formed from certain basic igneous rocks such as the norite of the Bushveld and the basalt of the high veld. No. 932 is typical of the former and No. 1607 of the latter. The attached tables and diagrams present the results of the mechanical analyses of a number of soils belonging to these six groups of soils and also of a number of soils which are not regarded as typical of a large area of soil, but which are at the same time very interesting. One feature of these Transvaal soils is their poverty in the silt, fine silt and very fine silt fractions. In this respect the typical grey soils are better supplied than the typical red sedentary soils, but even they show comparatively small percentages of the finer silts. These grey soils also contain less fine gravel and "sand" and more "fine sand" than the corresponding red and brown soils. The medium grey soils are very nice farming soils, as may be seen from the fact that they are being largely taken up for potato growing in the Bethal and Standerton districts.

The mechanical and chemical analyses of about 40 soils are given in Tables VII., VIII. and IX.



TABLE VII.—Mechanical and Chemical Analyses of Typical Transvaal Soils.

Class.	I. Black Turf Soils.						II. Dark-grey Clay Loams.			III. Red and Brown Heavy Loams.				IV. Grey and Brownish Grey Heavy Loams.				V. Red and Brown Medium to Sandy Loams.			
No. of Sample DISTRICT ..	932 Rustburg O <sub>2</sub> nil	1486 Knab O <sub>2</sub> 2.25	1606 Erni O <sub>2</sub> nil	1607 Erni O <sub>2</sub> nil	1738 Waterberg O <sub>2</sub> nil	1919 Botha O <sub>2</sub> nil	1865 Stand. O <sub>2</sub> nil	2030 Wolmaria O <sub>2</sub> nil	2133 Hoodbe O <sub>2</sub> nil	1610 Zout O <sub>2</sub> nil	1830 Erni O <sub>2</sub> nil	1977 Pret O <sub>2</sub> 1.50	2034 L. d'Ar O <sub>2</sub> 1.50	2039 K. v. d. B. O <sub>2</sub> nil	1365 W. d'Ar O <sub>2</sub> nil	2190 Hoodbe O <sub>2</sub> nil	2211 Botha O <sub>2</sub> nil	1940 Heldberg O <sub>2</sub> nil	2021 Hoodbe O <sub>2</sub> nil	2060 Pret. O <sub>2</sub> nil	2185 Zout. O <sub>2</sub> nil
Stones over 1 in. in diameter ..	8.52	6.42	6.84	11.01	9.11	7.98	5.12	3.96	3.20	2.47	3.47	3.40	2.25	4.04	3.43	2.70	3.18	1.28	4.91	2.14	1.15
Composition of Air-dry Earth :—	6.80	10.62	10.06	15.05	7.17	8.14	6.93	5.26	5.01	10.31	6.92	9.43	12.12	9.33	4.85	4.74	7.76	3.31	6.37	3.71	6.78
Moisture ..	1.02	3.62	0.63	0.15	2.27	1.17	0.19	0.02	0.20	0.08	2.99	8.80	3.37	10.80	0.03	1.68	0.67	3.95	2.40	0.92	1.60
Loss on Ignition ..	8.81	19.44	20.94	5.75	8.54	9.15	45.10	2.97	4.78	27.61	25.32	15.82	18.50	13.97	22.76	3.27	29.55	39.50	28.74	41.34	44.48
Mechanical :—	16.05	12.44	17.09	11.84	18.20	14.27	19.32	32.87	24.86	10.01	19.28	12.92	11.80	15.86	27.56	35.29	19.16	31.40	21.59	30.60	10.40
Fine gravel ..	4.85	9.96	8.68	7.75	6.67	9.24	8.67	14.88	22.32	4.95	5.05	6.80	1.73	6.19	9.06	22.01	11.53	3.40	4.98	2.30	5.56
Fine Sand ..	2.64	5.52	4.62	5.07	2.36	3.30	4.63	8.97	10.04	8.12	3.68	4.14	3.75	3.82	4.61	6.18	5.42	2.77	1.80	0.93	5.16
Silt ..	3.24	3.86	4.55	5.67	3.03	3.44	3.88	4.08	2.95	4.51	4.06	5.15	5.75	4.78	4.60	4.27	5.62	1.96	7.18	1.37	5.33
Very fine Silt ..	43.71	38.16	28.06	37.98	44.40	45.15	36.26	24.50	24.79	30.28	29.09	33.20	36.00	30.96	19.80	18.45	23.21	13.02	20.24	17.16	22.01
*Clay, less than 0.002 ..	95.64	99.05	101.47	100.27	101.75	101.82	100.10	97.51	98.15	99.06	99.86	99.66	98.27	99.75	97.50	99.20	97.16	100.60	98.21	100.47	99.45
Total ..	2.50	5.56	3.17	6.34	5.64	4.69	3.44	1.20	1.72	3.84	5.63	8.48	7.00	5.92	1.73	2.16	2.24	0.96	2.30	2.52	2.68
*Containing :—	13.65	7.89	4.27	9.00	8.92	10.84	8.08	—	—	9.56	8.47	9.00	13.88	11.12	4.56	3.45	5.38	5.00	8.28	4.42	8.24
Iron oxide soluble in acid ..	41.21	32.60	24.89	31.64	38.76	40.46	32.82	23.30	23.07	26.44	23.97	24.72	29.00	25.04	18.07	16.30	19.37	12.06	17.94	14.68	19.33
Alumina soluble in acid ..	59.45	63.48	65.12	54.90	63.02	67.27	72.99	77.80	79.56	72.66	69.78	56.99	52.52	53.55	81.93	77.90	81.56	87.54	72.08	84.53	74.39
Clay minus iron oxide ..	20.84	17.81	17.40	17.40	19.25	16.71	14.18	10.99	10.68	13.42	19.85	28.65	32.66	33.67	8.48	10.10	9.71	7.73	15.75	9.22	17.43
Chemical :—	3.80	0.81	0.86	0.47	1.02	0.04	0.32	0.76	0.66	0.11	0.02	0.09	0.23	0.14	0.37	0.26	0.61	0.08	0.08	0.08	0.09
Insoluble Matter ..	0.40	0.11	0.13	0.15	0.10	0.44	0.22	0.47	0.35	0.01	trace	0.14	0.11	0.14	0.41	0.32	0.32	0.09	0.08	0.09	0.11
Iron Oxide and Alumina ..	0.05	0.24	0.38	0.11	0.45	0.24	0.13	0.31	0.21	0.13	0.10	0.12	0.13	0.08	0.33	0.24	0.24	0.10	0.10	0.16	0.08
Lime ..	0.16	0.10	0.09	0.08	0.07	0.02	0.05	0.66	0.05	0.18	0.13	0.04	0.06	0.06	0.07	0.05	0.09	0.02	0.03	0.03	0.08
Magnesia ..	100.02	99.60	100.91	99.27	100.27	100.84	99.94	99.61	99.72	99.78	100.27	99.86	100.08	101.01	100.07	99.84	99.97	99.88	99.40	99.96	100.11
Potash ..	0.098	0.109	0.237	0.302	0.133	0.161	0.135	0.092	0.105	0.063	0.137	0.106	0.122	0.115	0.111	0.171	0.108	0.063	0.081	0.066	0.087
Phosphoric Oxide ..	0.0013	0.0233	0.0135	0.0150	0.0140	0.0045	0.0040	0.0080	0.0047	0.0151	0.0022	0.0078	0.0068	0.0086	0.0021	0.0108	0.0034	0.0038	0.0092	0.0118	0.0113
Nitrogen ..	0.0187	0.0091	0.0079	0.0115	0.0059	0.0028	0.0016	0.0198	0.0070	0.0040	0.0026	0.0007	0.0005	0.0014	0.0077	0.0022	0.0148	0.0065	0.0004	0.0005	0.0006
" Available " Potash ..																					
" Available " Phosphoric oxide ..																					
Including :—																					
Nitrogen ..																					
" Available " Potash ..																					
" Available " Phosphoric oxide ..																					







LOSS ON IGNITION VERLIES BY UITGLOEIING

PERCENTAGE

FINE GRAVEL  
FYN KIEZEL

SAND  
ZAND

FINE SAND  
FYN ZAND

SILT  
SLYK

FINE SILT  
FYN SLYK

VERY FINE SILT  
ZEER FYN SLYK

CLAY  
KLEI

PERCENTAGE

IRON OXIDE  
IN CLAY

YZER OXIDE  
IN KLEI



5.70



5.12



8.48



5.63



7.00



VERIES BY UITGLOEING

LOSS ON IGNITION

PERCENTAGE

FINE GRAVEL  
FYN KIEZEL

SAND  
ZAND

FINE SAND  
FYN ZAND

SILT  
SLYK

FINE SILT  
FYN SLYK

VERY FINE SILT  
ZEER FYN SLYK

CLAY  
KLEI  
PERCENTAGE

IRON OXIDE  
IN CLAY

YZER OXIDE  
IN KLEI

■ 1.73

■ 1.72

■ 3.44

■ 1.20

■ 2.68





MOISTURE.

VOUCHT

Zonderige Gronden

Gryze Middelmattige Tot  
Zonderige Leemgronden

LOSS ON IGNITION. VERLIES BY UITGLOEING

PERCENTAGE.

FINE GRAVEL.  
FYN KIEZEL.

SAND.  
ZAND.

FINE SAND.  
FYN ZAND.

SILT.  
SLYK.

FINE SILT.  
FYN SLYK.

VERY FINE SILT.  
ZEER FYN SLYK.

CLAY.  
KLEI.

PERCENTAGE.

IRON OXIDE.  
IN CLAY.

YZER OXIDE  
IN KLEI

■ 1.92

■ .72

■ .87

■ 1.25





MOISTURE  
VOCHT

N<sup>o</sup> 1486

N<sup>o</sup> 1738

N<sup>o</sup> 1919

N<sup>o</sup> 1607

N<sup>o</sup> 1606

LOSS ON IGNITION VERLIES BY UITGLOEIING

PERCENTAGE

FINE GRAVEL

FYN KIEZEL

SAND  
ZAND

FINE SAND  
FYN ZAND

SILT  
SLYK

FINE SILT  
FYN SLYK

VERY FINE SILT  
ZEER FYN SLYK

CLAY  
KLEI  
PERCENTAGE

IRON OXIDE  
IN CLAY

YZER OXIDE  
IN KLEI

556

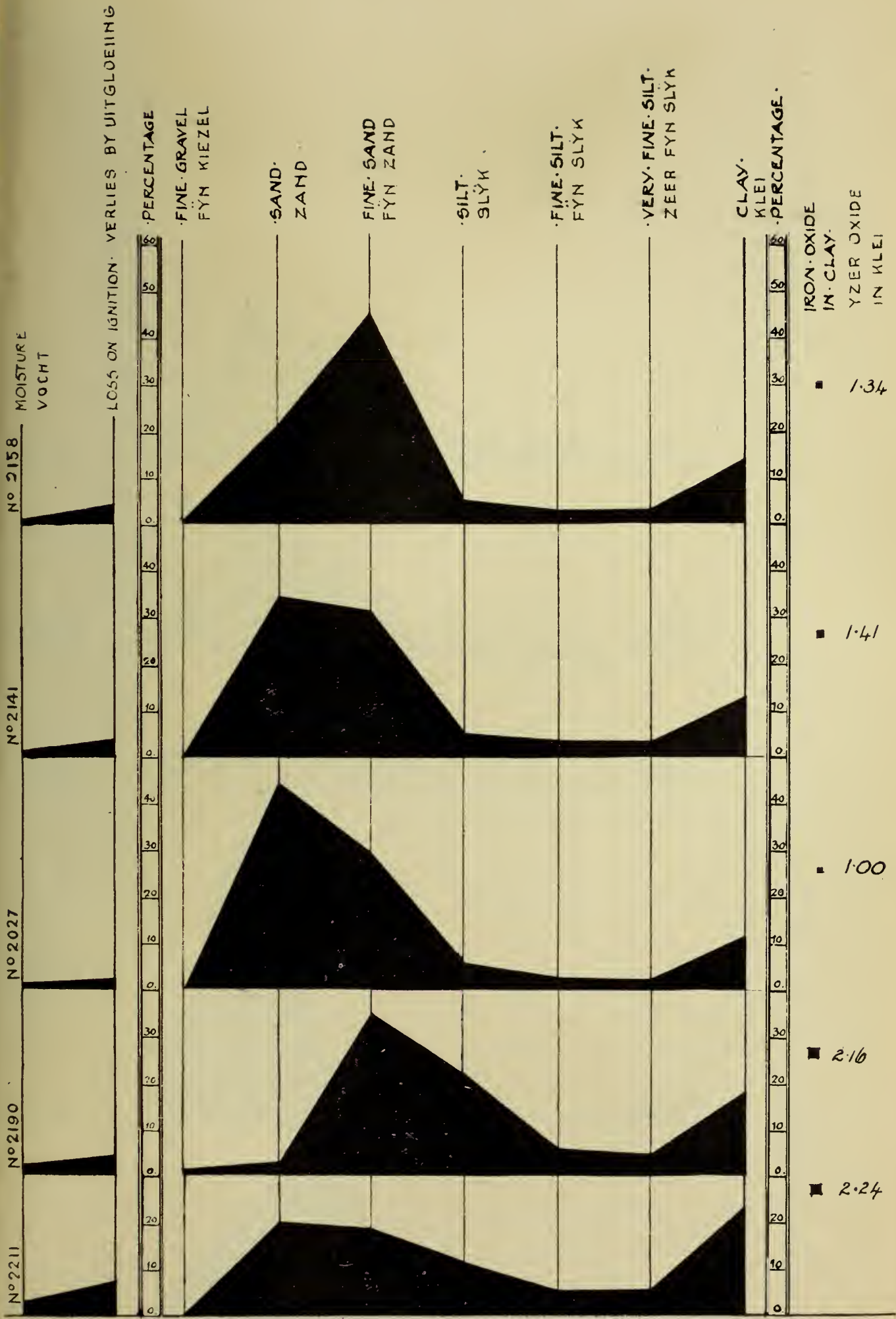
564

469

634

317









VERLIES BY UITGLOEING

LOSS ON IGNITION

PERCENTAGE

FINE GRAVEL

FYN KIEZEL

SAND

ZAND

FINE SAND

FYN ZAND

SILT

SLYK

FINE SILT

FYN SLYK

VERY FINE SILT

ZEER FYN SLYK

CLAY

KLEI

PERCENTAGE

IRON OXIDE

IN CLAY

YZER OXIDE

IN KLEI

■ 1.44

■ 2.88

■ 2.61

■ 1.40

■ .80





VERLIES BY UTGLOEING.

LOSS ON IGNITION

PERCENTAGE

FINE GRAVEL  
FYN KIEZELSAND  
ZANDFINE SAND  
FYN ZANDSILT  
SLYKFINE SILT  
FYN SLYKVERY FINE SILT  
ZEER FYN SLYKCLAY  
KLEI

PERCENTAGE

IRON OXIDE  
IN CLAYZYDER OXIDE  
IN KLEI

■ 2.52

■ 2.30

■ .96

■ 6.08

■ 2.30



VOUCHER

VOUCHER

LOSS ON IGNITION. VERLIES BY UITGLOEING

PERCENTAGE.

FINE GRAVEL

FYN KIEZEL

SAND

ZAND

FINE SAND

FYN ZAND

SILT

SLYK

FINE SILT

FYN SLYK

VERY FINE SILT

ZEER FYN SLYK

CLAY

KLEI

PERCENTAGE.

IRON OXIDE

IN CLAY

YZER OXIDE

IN KLEI

38

90

104





VOCHT

LOSS-ON-IGNITION. VRIES BY UITGLOEING

PERCENTAGE.

FINE GRAVEL  
FYN KIEZEL

SAND  
ZAND

FINE SAND  
FYN ZAND

SILT  
SLYK

FINE SILT  
FYN SLYK

VERY FINE SILT  
ZEER FYN SLYK

CLAY  
KLEI

PERCENTAGE.

IRON OXIDE  
IN CLAY

YZER OXIDE  
IN KLEI

5.92

3.84

3.08

4.96

2.08

3.76





TABLE VIII.—Mechanical and Chemical Analyses of Typical Transvaal Soils—continued.

Class.	VI.				VII.										VIII.—Miscellaneous.											
	Grey Medium to Sandy Loams.				Sandy Soils.										(a) Heavy Chocolate Soils (from Springbok Flats).				(b) Heavy Non-sedentary Soils.				(c) Medium to Light Non-sedentary Soils.			
	2027 Wohn. o/o nil	2141 Sand. o/o nil	2158 Stand. o/o nil	1636 Watering o/o nil	1823 Mlbs. o/o nil	1901 Rustbgs. o/o nil	2179 Pret. o/o nil	2186 Zout. o/o 1.0	2398 Wohn. o/o 0.20	1740 Watering o/o nil	1741 Watering o/o nil	1742 Watering o/o nil	1700 Pret. o/o nil	1982 Pret. o/o nil	2045 Rustbgs. o/o nil	2097 Rustbgs. o/o nil	1765 Harb. o/o nil	1954 Pret. o/o nil	1955 Pret. o/o 5.0	1990 Krusht. o/o nil						
No. of Sample .. .. .	1.61	1.77	1.32	0.47	0.44	0.47	0.66	0.38	0.55	6.63	5.10	6.56	3.46	4.67	3.11	4.12	0.50	3.08	3.22	1.09						
Stones over $\frac{1}{4}$ in. in diameter ..	2.55	4.34	4.61	1.73	2.42	2.78	2.85	2.90	1.74	7.86	7.31	7.43	6.31	6.84	7.79	7.04	4.67	6.82	7.45	3.64						
Composition of Air-dry Earth :—																										
Moisture .. .. .																										
Loss on Ignition .. .. .																										
Mechanical :—																										
Fine gravel .. 1.0 —3.0	0.02	0.68	1.07	1.47	4.19	9.17	0.61	6.83	7.68	2.93	0.60	0.94	2.52	1.64	0.78	0.44	0.13	4.20	2.36	2.75						
Sand .. 0.2 —1.0	44.46	34.73	21.62	68.80	61.54	68.01	69.33	55.62	33.02	10.62	10.65	9.52	21.22	17.14	6.93	13.88	36.40	27.46	30.72	39.20						
Fine Sand .. 0.04 —0.20	29.82	32.52	45.20	18.49	19.96	9.43	10.46	18.84	47.48	20.24	23.36	18.42	18.49	15.25	27.58	19.14	26.98	26.15	23.52	28.60						
Silt .. 0.01 —0.04	6.01	5.57	5.44	2.60	2.32	1.95	3.02	3.65	1.81	4.92	5.55	5.13	12.79	10.61	6.88	14.19	10.93	6.24	5.62	3.63						
Fine Silt .. 0.004 —0.01	2.79	3.87	3.21	1.04	0.68	0.93	2.02	2.38	0.86	4.80	3.47	5.53	8.12	10.96	6.96	11.21	7.64	6.08	5.98	6.95						
Very fine Silt .. 0.002 —0.004	2.40	3.78	3.57	0.84	0.33	0.29	0.26	2.54	1.17	6.14	2.13	4.14	3.48	5.37	3.67	3.38	4.09	4.61	2.42	1.08						
*Clay, less than 0.002	11.50	13.17	14.36	4.75	7.38	8.13	9.16	7.05	5.70	36.99	41.48	41.42	25.92	26.69	32.21	24.88	9.04	15.87	15.33	14.58						
Total ..	101.16	100.43	100.40	100.19	99.17	101.16	100.17	101.20	100.21	101.13	99.65	99.09	102.31	99.26	95.91	98.88	100.38	100.51	96.62	101.54						
*Containing :—																										
Iron oxide soluble in acid ..	1.00	1.41	1.34	0.38	0.90	1.04	1.40	0.72	0.80	5.12	5.70	6.08	3.76	2.08	4.96	3.08	1.44	2.61	2.88	1.92						
Alumina soluble in acid ..	1.94	2.98	3.17	1.40	2.97	3.00	2.35	2.11	0.54	—	—	—	—	—	—	—	—	—	—	—						
Clay minus iron oxide ..	10.50	11.76	13.02	4.37	6.48	7.09	7.76	6.33	4.90	31.87	35.78	35.34	22.14	24.61	26.44	21.80	7.60	13.26	12.45	12.66						
Chemical :—																										
Insoluble Matter ..	89.74	87.54	50.39	95.21	90.21	93.84	89.32	91.10	93.30	64.78	66.14	65.52	74.25	73.55	62.38	70.61	85.42	67.27	72.24	87.10						
Iron Oxide and Alumina ..	4.56	5.68	25.83	2.90	7.05	3.26	6.77	5.65	3.95	19.40	19.95	18.10	15.21	13.90	25.67	16.11	9.05	19.28	17.51	8.22						
Lime .. .. .	0.34	0.05	0.03	0.09	trace	0.04	0.12	0.07	0.34	0.22	0.14	0.41	0.22	0.30	0.11	0.34	0.38	0.10	0.14	0.06						
Magnesia .. .. .	0.24	0.04	trace	0.03	0.02	0.02	0.07	0.05	0.16	0.15	0.05	0.21	0.31	0.16	0.19	0.31	0.17	0.09	0.12	0.15						
Potash .. .. .	0.06	0.09	trace	0.01	0.01	0.04	0.06	0.05	0.10	0.28	0.19	0.29	0.33	0.20	0.72	0.18	0.05	0.05	0.02	0.11						
Phosphoric Oxide .. .. .	0.04	0.03	0.05	0.01	0.04	0.07	0.03	0.03	0.03	0.09	0.05	0.06	0.04	0.05	0.08	0.04	0.08	0.02	0.02	0.05						
Total ..	99.13	99.54	99.75	100.45	100.19	100.50	99.82	100.24	100.20	99.51	98.93	98.58	100.13	99.51	100.05	99.35	100.32	100.71	99.62	100.42						
Including :—																										
Nitrogen .. .. .	—0.60	0.095	0.104	0.028	0.031	0.040	0.084	0.053	0.039	0.11760	0.11550	0.12460	0.105	0.116	0.095	0.160	0.057	0.126	0.146	0.0672						
"Available" Potash .. .. .	0.00270	0.0076	trace	0.00120	0.00200	0.00390	0.00250	0.00500	0.01220	0.01630	0.01850	0.02060	0.0191	0.00100	0.01650	0.00770	0.00460	0.01130	0.00290	0.0081						
"Available" Phosphoric oxide	0.00810	0.00150	0.00040	0.00140	0.00060	0.00090	0.00120	0.00080	0.00070	0.00120	0.00100	0.00110	0.00100	0.00190	0.00150	0.00090	0.00100	0.00140	0.00160	0.0006						

TABLE IX.—Average Mechanical Analyses of Different Classes of Transvaal Soils.

Class.	I. Black Turf Soils.	II. Grey Clay Loams.	III. Red and Brown Heavy Loams.	IV. Grey Heavy Loams.	V. Red and Brown Medium to Sandy Loams.	VI. Grey Medium to Sandy Loams.	VII. Sandy Soils.
No. of Analyses .. .. .	6	3	5	3	4	3	6
Moisture.. .. .	% 8.31	% 4.09	% 3.13	% 3.17	% 2.37	% 1.57	% .50
Loss on Ignition .. .. .	9.64	5.73	9.62	5.78	5.04	3.83	2.40
Diameter.							
Fine Gravel .. .. .	1.68	.14	5.35	.79	2.22	.59	4.99
Sand .. .. .	10.60	7.62	20.24	15.53	38.51	33.60	59.39
Fine Sand .. .. .	14.98	25.68	13.97	27.34	23.50	35.85	20.78
Silt .. .. .	7.86	15.29	5.54	14.20	3.31	5.67	2.56
Fine Silt .. .. .	3.92	7.88	4.70	5.40	2.66	3.29	1.32
Very Fine Silt .. .. .	3.96	3.64	4.85	5.03	3.96	3.25	1.21
Clay up to .. .. .	39.58	28.52	31.91	20.49	18.11	13.01	7.03
Total .. .. .	100.53	98.59	99.31	97.73	99.68	100.66	100.18
Iron Oxide in Clay Fraction .. .. .	4.65	2.12	6.17	2.04	2.12	1.25	.87
Alumina .. .. .	9.10	—	10.41	4.47	6.49	2.70	2.06
Clay—Iron Oxide .. .. .	34.93	26.40	25.83	18.45	15.99	11.76	6.16

TABLE X.

## ANALYSES OF SAMPLES OF BAT GUANO.

No. of Sample.	2927	3031	3216	3247	3270
Total Nitrogen .. .. .	% 2.60	% .43	% 1.33	% 3.53	% 5.26
„ Phos. oxide .. .. .	8.54	4.90	4.75	1.40	4.66
„ Potash .. .. .	1.40	.81	.29	.58	.95
Moisture .. .. .	—	13.6	—	70.10	—
Value per ton delivered at nearest Railway Station .. .. .	73/-	24/-	35/-	57/-	94/-

Average valuation 56/6.

This valuation is based on the unit prices of the various manurial ingredients in this country. No. 3247 was a fresh moist sample smelling strongly of ammonia. Special precautions therefore had to be taken in drying it to absorb the ammonia given off during the process. A considerable portion of this ammonia would be lost in handling and drying the material before transport.

## FERTILISERS OTHER THAN BAT GUANO.

Several samples of special fertilisers for maize, potatoes, etc., have been received from farmers and manufacturers, and on account of their prevailing low grade character the analyses are given here.

TABLE XI.

SAMPLES RECEIVED FROM MANUFACTURERS.

No. of Sample.	2879	2880	3389	3390
	%	%	%	%
Nitrogen .. .. .	2.55	2.60	0.64	1.18
Phosphoric oxide :—				
Water sol. .. .. .	5.9	1.7	—	—
Sol. in 2 % Citric acid .. .. .	4.3	10.4	1.4	5.2
Insoluble .. .. .	1.0	1.3	0.6	—
Total .. .. .	11.2	13.4	2.0	5.8
Potash .. .. .	4.6	14.2	1.0	1.3
Valuation per ton at purchaser's nearest Railway Station .. .. .	118/-	150/-	15/-	39/-

Average valuation 80/6.

TABLE XII.

SAMPLES RECEIVED FROM FARMERS.

No. of Sample ..	3162	3285	3288	3382	3387	3388
	%	%	%	%	%	%
Nitrogen .. .. .	.29	2.42	.69	2.17	.60	.59
Phosphoric oxide :—						
Water soluble .. .. .	—	2.5	—	—	—	—
Soluble in 2 % citric acid .. .. .	—	5.9	—	—	—	—
Insoluble .. .. .	—	.9	—	—	—	—
Total .. .. .	1.1	9.3	2.2	9.3	2.4	1.6
Potash .. .. .	.9	nil	1.2	.4	.9	1.0
Valuation per ton at pur- chaser's nearest Rail- way Station .. .. .	nil	82/-	15/-	70/- to 80/-	15/-	7/6

Average valuation, 33/-

I should say the average price paid for these fertilisers by the farmer was somewhere about £6 per ton, *i.e.*, nearly four times their actual value. In four cases out of six the material is too low grade for the farmer to handle at any price.

TABLE XIII.

KRAAL MANURE (3 SAMPLES).

No. .. .. .	3070	3071	2996
	%	%	%
Moisture .. .. .	6.2	5.7	—
Ash (I) total .. .. .	47.8	50.5	—
(II) insoluble in acid .. .. .	38.5	41.4	—
Nitrogen .. .. .	1.83	1.92	.23
Phos. oxide .. .. .	.28	.28	.74
Potash .. .. .	.99	1.04	.60

Samples 3070 and 3071 were dry and had been sifted through sieves with the idea of applying them by means of the fertiliser attachment drill.

Sample 2996 appears to be a very old deposit of kraal manure.

[U.G. 2—'15.]



TABLE XIV.

## LIMES AND LIMESTONES.

LIMESTONE.																	LIME.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)		
Sample No.	2928	3004	3005	3006	3007	3008	3119	3120	3171	3186	3293	3294	3295	3296	3370	2965	3326	3369	
Insoluble ..	% 1.42	% 13.32	% 4.84	% 9.49	% 6.47	% 39.50	% 10.90	% 21.06	% 1.49	% 1.82	% —	% —	% —	% —	% 29.89	% 1.96	% —	% —	
Iron oxide and Alumina ..	.46	3.26	.84	3.78	.82	10.68	1.16	1.76	.40	.36	—	—	—	—	—	nil	—	3.88	
Lime ..	54.20	40.00	51.86	45.72	49.90	24.86	27.84	30.80	51.52	50.52	51.69	47.06	53.61	55.55	24.04	61.60	81.76	34.76	
Magnesia ..	.47	4.78	1.30	1.60	2.30	1.98	19.03	7.74	1.65	1.74	1.54	2.09	1.70	.41	2.09	nil	—	.73	
Carbonic Acid ..	—	—	—	—	—	—	—	—	—	—	—	—	..	—	—	24.50	—	—	
Moisture ..	.01	—	—	—	—	—	—	—	—	—	..	..	—	—	18.14	—	—	—	
Loss on Ignition ..	43.35	—	—	—	—	—	.4161	38.63	45.32	46.03	—	—	—	—	23.09	35.34	—	46.90	

(1) Godwan River, Transvaal.  
 (2) Britstown, Cape.  
 (3) Britstown, Cape.  
 (4) Britstown, Cape.  
 (5) Britstown, Cape.  
 (6) Piet Retief, Transvaal.  
 (7) Kimberley, Cape.  
 (8) Kimberley, Cape.  
 (9) Ventersdorp, Transvaal.

(10) Ventersdorp, Transvaal.  
 (11) Pienaars River, Transvaal.  
 (12) Pienaars River, Transvaal.  
 (13) Godwan River, Transvaal.  
 (14) Hennops River, Transvaal.  
 (15) Vredefort District, O.F.S.  
 (16) Pietersburg, Transvaal.  
 (17) Ventersdorp, Transvaal.  
 (18) Vredefort District, O.F.S.

Table XIV. gives the analyses of 18 samples of limestone, lime, etc.

High-class limestone is very scarce in this country, but there is a fair amount of medium to low class material, nearly all of which exists in the form of recent surface deposits. This material costs just as much if not more to burn than the better limestone, and although the product may be all right for building or for cement manufacture it is as a rule unsuitable for agriculture unless artificially ground, which makes it more expensive than the best white lime. The demand for lime for agricultural purposes has increased very much of late, and acting on recent experience in Europe and elsewhere farmers have been turning their attention to ground limestone, which is naturally much cheaper than burnt lime.

Unfortunately a few firms have been offering a very coarsely-ground article, which is in my opinion of little or no value. The price charged for this coarsely-ground material is generally about 25s. per ton f.o.r. works, which is considerably more than the value of finely-ground limestone. Owing to the fact that large areas contain no deposits of limestone whatever the above price is increased by the railage to something like 35s. per ton in such districts. I do not see why the really finely-ground article should not be sold in bags at 20s. per ton f.o.r. works, and if there is an object more worthy of Government support than this I have not yet met with it. This ground limestone is an admirable thing for light soils, but the farmer must get it cheap and use it in large quantities.

Any limestone with over 45 per cent. of lime can be used profitably, but better qualities are naturally more suitable.

#### MINERALS OF AGRICULTURAL IMPORTANCE.

Only one of the minerals received is of any interest. This consists of a soft grey phosphatic rock from Aasvogel Kranz, Bethlehem District, O.F.S. The phosphoric oxide is unfortunately combined chiefly with alumina and its solubility is very low.

<i>Analysis :</i>	Per cent.
Insoluble matter ... ..	77.03
Iron oxide and alumina ... ..	6.63
Lime ... ..	Nil.
Potash ... ..	.97
Phosphoric oxide: (i.) total ... ..	15.76
(ii.) soluble in 2% citric acid ... ..	.30

TABLE XV.

## WATERS.

PARTS PER 100,000											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
No.	2914	3095	3099	3100	3123	3254	3255	3263	3284	3361	3379
Total Dissolved Solids	Contains large amounts of Iron and Aluminium Sulphates.	13·62	96·2	44·0	39·3	250·8	277·9	5·8	68·3	564·2	136·3
Silica		2·2	5·2	4·0	2·0	3·4	3·2	—	6·5	3·1	—
Iron Oxide and Alumina		nil	nil	nil	nil	nil	nil	—	nil	nil	—
Lime		2·2	3·4	7·7	8·0	44·3	49·6	—	5·4	97·8	—
Magnesia		·7	6·9	9·2	6·4	24·0	23·3	—	—	56·8	—
Chlorine		—	5·7	3·9	—	96·3	110·8	1·1	5·0	202·8	21·8
Sulphuric Anhydride		nil	nil	nil	—	5·2	8·9	—	3·3	54·8	11·8
Carbonic Acid		—	37·4	18·0	—	10·3	12·3	—	21·6	30·3	22·5
Black Alkali		—	65·3	4·6	—	nil	nil	—	18·2	—	Nil
Permanent hardness		—	—	—	—	—	—	—	—	—	25·2

(1) Near Witbank, Transvaal (from a coal mine).

(2) East Griqualand.

(3) Haman's Kraal, Pretoria District, Transvaal.

(4) Haman's Kraal, Pretoria District, Transvaal.

(5) Hlatikulu, Swaziland.

(6) Geluk, Vryburg District, C.P.

(7) Geluk, Vryburg District, C.P.

(8) Doornkop, Middelburg District, Transvaal.

(9) Britton, Bloemhof District, Transvaal.

(10) Omdraais Vlei, Prieska District, C.P.

(11) Draghoender, Prieska District, C.P.



Table XV. gives the analyses of 11 samples of water.

Of these waters, Nos. 3099, 3254, 3255, 3361 and 3379 may be classed as excessively saline and unfit for irrigation purposes. Four of these are from the North-Western Districts of the Cape Province.

#### SAMPLE OF SLOP WATER FROM GERMISTON MUNICIPALITY.

This was being disposed of by irrigation.

	Parts per 100,000.
Suspended matter ... ..	60.5
Organic ... ..	35.7
Mineral ... ..	24.8
Nitrogen ... ..	1.32
Dissolved Matter ... ..	67.2
Organic ... ..	20.0
Mineral ... ..	47.2
Chlorine ... ..	14.9
Phosphoric acid ... ..	0.605
Total Nitrogen ... ..	5.88
Ammoniacal Nitrogen ... ..	4.69
Potash ... ..	0.31
Alkalinity to Methyl orange expressed as	
Sodium bicarbonate ... ..	35.9
Alkalinity to Phenolphthalein expressed as	
Sodium carbonate ... ..	5.9

The disposal of this water would require a very well-drained soil.

#### FEEDING STUFFS (3 SAMPLES).

These include:—

- (1) Sample of maize germ meal produced by the milling process.
- (1) Sample of maize germ separated by patent "punching" process.
- (1) Sample of feeding stuff, consisting chiefly of oat hulls.

The results of the analyses of these 3 samples are given in the following table:—

TABLE XVI.

	Maize germ meal.	Maize germ.	Oat hulls.
	%	%	%
Moisture .. ..	8.9	8.5	8.7
Ash .. ..	3.3	—	7.0
Protein .. ..	12.0	—	5.5
Fat .. ..	12.8	22.2	2.3
Carbohydrates .. ..	59.0	—	49.3
Fibre .. ..	2.0	—	27.2
	100.0		100.0

#### DIPS, INSECTICIDES AND FUNGICIDES (129 SAMPLES).

These include:—

Dipping tank liquid ... ..	94
Arsenite of soda ... ..	1
Proprietary sheep dips ... ..	7
Insecticides ... ..	8
Insecticide ingredients ... ..	8

Those of the dipping tank liquid came from the Piet Retief East Coast Fever area through the medium of the Veterinary Division. In many cases we were only able to determine the arsenic present as arsenite, owing to the smallness of the samples.

In order to test roughly the theory that the oxidation of arsenite to arsenate is a bacterial problem, and whether it could be solved on the usual lines, an experiment was made on three lots of an ordinary dipping tank fluid which had

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been in use for a short period. Each lot (measuring 500 c.c.) was put into a glass milk bottle: No. 1 was corked but no addition was made; No. 2 was open and no addition was made; No. 3 was open and 1 c.c. of Pearson's Hycol was added. The experiment was started on the 25th September, 1913, and at the end of nine months the solutions were examined. The volumes were meanwhile kept constant by adding water where loss by evaporation was taking place. Inverted beakers were kept over the necks of the open bottles and the contents were occasionally stirred. The results were as follows:—

	Arsenious oxide in dip.	
	Total.	as Arsenite.
(a) Original dip .. .. .	% .132	% .131
(b) after 9 months—		
(i) corked, no addition .. .. .	.127	.122
(ii) open,            ,, .. .. .	.130	.0024
(iii)   ,, Hycol added .. .. .	.128	.040

The Hycol, whilst retarding the oxidation to some extent, has not prevented it entirely.

#### PROPRIETARY SHEEP DIPS (7).

These consisted of 3 liquid "carbolic dips," 3 arsenic-sulphur powder dips, and 1 caustic soda sulphur liquid dip.

The last named was sold as a "lime-sulphur" dip.

The following are the results of the analyses of the above:—

TABLE XVII.  
LIQUID PHENOLIC DIPS.

	No. 1.	No. 2.	No. 3.
	%	%	%
Pyridine fraction .. .. .	1.7	0.6	0.7
Hydrocarbon oils .. .. .	57.5	25.5	38.8
Fatty acids .. .. .	11.6	31.8	24.9
Phenols .. .. .	13.2	21.2	23.8
	84.0	79.1	88.2

No. 1 contained a considerable amount of crude tarry or pitchy material, the quantity or nature of which was not determined. It represents the crudest material of the three and is also poorest in phenols (which form the active portion of the dip) and richest in neutral tar oils.

TABLE XVIII.  
SULPHUR-ARSENIC POWDER DIPS.

	No. 1.	No. 2.	No. 3.
	%	%	%
Sulphur .. .. .	16.8	33.66	25.70
Arsenious oxide .. .. .	19.45	21.62	20.31

A sample of the same dip as No. 2 analysed here two years previously contained 21.6 per cent. arsenious oxide and 62.2 per cent. of sulphur.

## CAUSTIC SODA-SULPHUR LIQUID DIP.

	Per cent.
Total sulphur ... ..	19.42
Sulphur as sulphides ... ..	13.12
Sulphur as sulphites and thiosulphates ...	6.12
Lime ... ..	.55
Soda ... ..	10.88

TABLE XIX.

## ANALYSES OF DIPPED AND UNDIPPED WOOLS.

No. of Sample.	Treatment.	Ether Extract (Wool Wax.)	Special Constituents in Ether Extract.	Water Extract (Suint.)	Moisture.	Extracted Wool (Pure wool fibre.)	Ash of Extracted Wool.	Ash of Water Extract.	Alkalinity of Water Extract (expressed as potassium carbonate.)
1a	Undipped ... ..	13.54	( <sup>1</sup> )	6.55	8.97	63.40	1.12	1.94	44.10
1	Lime 7 lbs., Sulphur 8 lbs. to 33 gals. water .. ..	13.54	0.28	4.62	7.76	64.35	1.26	—	21.18
12a	Undipped ... ..	14.09	( <sup>2</sup> )	8.81	11.05	61.11	2.34	—	45.45
12	Little's Fluid Dip .. ..	14.88	3.49	2.47	7.79	64.73	.74	—	43.86
23a	Undipped ... ..	16.94	( <sup>1</sup> )	10.58	11.20	50.58	2.12	—	—
23	Cooper's Dip .. ..	18.65	0.45	5.23	7.28	51.59	1.18	—	31.74
34a	Undipped ... ..	19.53	( <sup>1</sup> )	9.56	9.96	55.29	3.61	3.91	30.40
34	Caustic Soda and Sulphur ..	18.58	4.20	5.56	8.23	53.43	.98	—	34.66
45a	Undipped ... ..	16.66	—	11.38	12.10	51.43	2.17	5.97	39.72
45	MacDougall's Tobacco Extract	18.10	—	5.76	8.68	57.50	1.82	2.64	46.93
56a	Undipped ... ..	15.00	—	11.56	12.17	53.86	2.14	6.05	38.83
56	Hayward's Paste Dip .. ..	18.90	—	3.51	7.84	64.00	1.88	2.07	35.75
67a	Undipped ... ..	11.73	( <sup>1</sup> )	11.46	11.44	58.77	2.28	5.67	41.75
67	MacDougall's Tobacco Extract and Sulphur .. ..	17.90	4.20	2.78	7.42	62.60	1.83	1.05	53.29
78a	Undipped ... ..	18.39	—	9.65	9.93	53.27	2.55	—	—
78	MacDougall's Paste Dip ..	22.10	—	2.62	8.43	63.00	1.82	.85	33.09
89a	Undipped ... ..	15.44	—	13.38	12.13	51.57	1.85	6.53	37.55
89	Lime 4 lbs, Sulphur 8 lbs. in 25 galls. .. ..	19.70	—	4.16	7.49	59.80	1.91	2.26	24.41
3309	Caustic Soda and Sulphur ? ..	20.78	2.30 ( <sup>1</sup> )	8.70	6.22	38.85	1.59	4.68	34.04

N.B.—(<sup>1</sup>) Sulphur. (<sup>2</sup>) Constituents removed from ethereal solution by treatment with dilute sodium hydroxide.

Sample No. 3309 was received at a later date and was supposed to have been dipped in a Caustic Soda-Sulphur dip.

Specific gravity at 60.0 F., 1.297.

## WOOL (19 SAMPLES).

A number of samples of wool—both dipped and undipped—were submitted for analysis by the Sheep Division. The information required was the effect of dipping on the "yolk" of the wool.

The results of the analyses are given in table.

In nearly every case the percentages of ether extract (or wool wax) are higher in the dipped than in the undipped, but this appears to be due largely to the fixation of some of the constituents of the dip on the wool. The ether extract of the undipped wools was always of a pale-green colour, whilst that from the wools dipped in crude carbolic dip was of a dark red colour, and that from wools dipped with sulphur dips showed a certain amount of solid sulphur in the wax.

[U.G. 2—'15.]



The water extract (suint) was in every case lower in the dipped than in the undipped, as would be expected. The points which suggest themselves as important are:—

- (1) Whether the sulphur which is retained by the wool has a bad effect on the finished wool or is difficult to remove in the scouring.
- (2) The effect, if any, of the dip on the actual fibre of the wool. This latter point was not studied.

Owing to the samples being small we had to use them all up in the first extraction of the different constituents, and therefore had none to fall back on for detailed investigations.

#### DAIRY PRODUCTS.

These include:

Milk	...	...	...	...	...	...	11
Cream	...	...	...	...	...	...	6
Butter, etc.	...	...	...	...	...	...	4
Total							21

#### MISCELLANEOUS PLANT PRODUCTS (12 SAMPLES).

These include:—

Sugar Cane	...	...	...	...	...	6
Tobacco	...	...	...	...	...	4
Rubber Latex	...	...	...	...	...	2

#### SUGAR CANE.

TABLE XX.

RESULTS OF ANALYSES OF SAMPLES OF SUGAR CANE.

Variety	Uba.			Demarara.		
	(I)	(II)	(III)	(I)	(II)	(III)
	%	%	%	%	%	%
Cane sugar in juice ..	17.8	10.8	21.4	17.4	18.0	20.9
Reducing sugar, in juice	.25	1.1	.25	.5	.3	.5
Density (Brix) .. ..	18.5	14.3	22.6	18.1	19.4	21.8

With the exception of the sample Uba (II.), which was immature, the others show very good percentages of sugar and purity. They were all grown at Tzaneen.

#### RUBBER LATEX.

These two samples were from a species of *Ficus* growing in the Low Veld of the Eastern Transvaal. One of these was simply the clear wood sap. The other was from the inner bark and was evidently a true latex. It gave the following results:—

	Per cent.
Water	57.8
Solids	42.2
Loss on Washing	7.1
Resins (soluble in acetone)	27.6
Protein	2.6
Rubber (by difference)	4.9

The residue presumed to be rubber had the appearance and physical properties of rubber.

The drying of the latex was carried out "in vacuo" on sand as the sample was small and we had no proper apparatus for handling rubber samples.

The latex does not seem to be of any value owing to the preponderance of resinous bodies.

STOMACHS, INGESTA AND MATERIAL SUSPECTED OF POISONING STOCK  
(9 SAMPLES).

These were received from the Veterinary and Sheep Divisions.

CORRESPONDENCE, TRAVELLING, ETC.

The number of outgoing letters during the year was 514. The travelling included the attendance with exhibits at the Witwatersrand, Pietersburg, Maritzburg and Durban Shows, a visit to Woodbush district at the time of the Pietersburg Show in 1913, and attendance at the Rosebank, East London and Port Elizabeth Shows in 1914.

FIELD EXPERIMENTS.

An experiment on the manurial treatment of maize was begun on the Dryland Station at Groenkloof, but owing to a misunderstanding the ground allotted to us was entirely unsuitable owing to the unevenness in the soil and the steep slope of the ground, which resulted in part of the manure and soil being washed down to the bottom portions of the plots. The experiment was intended as a test for nitrogenous manures, but no reliable results were obtained. The experiment at Koedoespoort was continued for a third year, but owing to the general infestation with witch-weed the crop was cut off for ensilage in March. Selected portions, however, were measured off and the total weight of produce was ascertained and the dry matter calculated after determination of moisture in each lot.

The summarised results of the three years are given in Table XXII.

The following amounts of phosphoric oxide, potash and nitrogen per acre were removed by the crops produced on the various plots as deduced from analyses of the produce of each of the 16 plots (see Table XXI):—

TABLE XXI.

Plot.	Treatment.	Fertilising Constituents removed in Maize Crop—1912-13.		
		Phos. oxide.	Potash.	Nitrogen.
		lbs.	lbs.	lbs.
6 } 8 }	No manure .. .. .	{ 3.9 3.4	12.8 13.5	27.6 24.3
	Average .. .. .	3.7	13.2	26.0
1 } 9 }	Lime only .. .. .	{ 4.1 3.5	14.6 18.6	29.2 25.6
	Average .. .. .	3.8	16.6	27.4
2 } 3 } 4 } 5 } 7 }	Phosphates and, in some cases, nitrogen and potash as well. —	{ 9.8 13.7 5.6 7.1 9.1	25.7 39.8 24.5 30.5 32.3	47.2 82.0 35.5 44.5 45.7
10 } 11 } 12 } 13 } 14 } 15 } 16 }		{ 9.6 8.7 10.2 7.0 14.8 13.3 10.6	30.2 36.5 27.5 23.0 42.0 33.1 36.2	49.2 53.9 47.2 36.3 60.5 53.0 47.1
	Average .. .. .	10.0	31.8	50.2

The soil was calculated to contain originally

About 3,500 lbs. nitrogen.

,, 25 lbs. "available" phosphoric oxide.

,, 250 lbs. ,, potash per acre in the surface foot.

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TABLE XXII.—RESULTS OF MANURIAL EXPERIMENTS ON MAIZE AT KOEDOESPOORT, 1910-13  
(THREE YEARS).

Plot	Manurial treatment per acre.		Yield of Maize per acre.				Increase due to manure.				Value of increase at 9s. per 200 lb. 2 years.	Cost of Manure. 2 years.		Profit or Loss from Manuring. 2 years.	Yield per acre (both grain and stover). 1912-1913.		Plot			
			1910-11.				1911-12.					1910-11. 1911-12. 2 years.			In natural state.	Dry matter.				
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		£	s.					d.	£	s.
1	600 lb. Slaked Lime	..	..	..	..	..	..	..	..	625	1,062	186	460	646	1	9	1	6,316	1,785	1
2	600 lb. Slaked Lime and 200 lb. Superphosphate	..	..	..	..	..	..	..	..	898	1,993	459	1,391	1,850	2	2	0	9,870	4,621	2
3	1,000 lb. Ground Weenen phosphates.	Phos-	..	..	..	..	..	..	..	837	1,872	398	1,270	1,668	4	3	3	10,790	5,214	3
4	200 lb. Superphosphate	..	..	..	..	..	..	..	..	813	1,822	374	1,220	1,594	3	15	1	6,522	2,810	4
5	400 lb. Basic Slag	..	..	..	..	..	..	..	..	1,106	2,220	667	1,620	2,287	3	11	10	9,210	3,076	5
6	Nil	..	..	..	..	..	..	..	..	439	602	—	—	—	5	2	11	5,789	1,654	6
Plots 1 to 6 during the first two seasons carried a mixed crop of maize and velvet beans, sown together in the rows, which were 3 ft. 6 in. apart.																				
7	1,000 lb. Ground Weenen phosphates.	Phos-	..	..	..	..	..	..	..	1,224	2,217	562	1,733	2,995	5	3	5	11,052	3,667	7
8	Nil	..	..	..	..	..	..	..	..	662	484	—	—	—	—	—	—	4,868	1,565	8
9	600 lb. Slaked Lime	..	..	..	..	..	..	..	..	896	—	234	—	—	—	—	—	5,526	1,589	9
10	600 lb. Slaked Lime and 200 lb. Superphosphate	..	..	..	..	..	..	..	..	1,214	—	552	—	—	—	—	—	10,526	3,580	10
11	400 lb. Basic Slag	..	..	..	..	..	..	..	..	1,497	2,433	835	1,949	2,784	6	5	4	9,474	3,663	11
12	200 lb. Superphosphate	..	..	..	..	..	..	..	..	1,199	—	537	—	—	—	—	—	8,932	3,544	12
13	400 lb. Bone Meal	..	..	..	..	..	..	..	..	1,612	1,734	950	1,250	2,200	4	19	0	8,947	2,697	13
14	200 lb. Superphosphate and 100 lb. Nitrate of Soda.	..	..	..	..	..	..	..	..	1,459	—	797	—	—	—	—	—	10,520	4,693	14
15	150 lb. Nitrate of Soda. 200 lb. Bone Meal and 100 lb. Superphosphate	..	..	..	..	..	..	..	..	1,305	2,016	643	1,532	2,175	4	17	11	11,579	4,321	15
16	200 lb. Superphosphate .. 150 lb. Nitrate of Soda and 100 lb. Sulphate of Potash.	..	..	..	..	..	..	..	..	1,336	—	674	—	—	—	—	—	8,940	3,650	16
Plots 7 to 16 carried maize only right through, rows 3 ft. apart the first two seasons. Plots 9, 10, 12, 14, and 16 were completely spoiled by pigs in 1912.																				
*Profit.																				



On the plots receiving phosphates the average treatment was about 70 lbs. phosphoric oxide per acre (for the whole period), of which about one-half has probably been removed by the crops in the three years of the experiment. On the phosphate plots the principal limiting factors during the period appears to have been the rainfall (and of course the witch-weed), on top of which there has probably been a slight deficiency in nitrogen and phosphates. No detailed conclusions can be drawn from this last year's results on account of the upsetting influence of the witch-weed, which was particularly bad on the first six plots, but was also general over the whole of the experimental area. One can, however, safely say that even under the most adverse conditions the use of phosphates for the maize crop on a soil of this kind cannot fail to give very profitable results.

I should like to emphasise the following points with regard to the equipment and staff of the Division. It is highly desirable that a competent clerical assistant be provided for the Division to take over all responsibility for routine office work. This would set me free to devote a greater amount of time to technical matters and would enable me to do a little travelling about.

The unsuitability of our present quarters has already been pointed out, and in view of the present financial condition of the country I do not intend to go any further into the matter.

If we are to make the best possible use of our increased staff we must have opportunities of travelling about, making field observations, etc., and getting into touch with agricultural matters outside the office.

H. J. VIPOND,

Chemist.



## APPENDIX XII.

## DIVISION OF PUBLICATIONS.

## ANNUAL REPORT, 1913-14.

The Secretary for Agriculture.

I have the honour to submit my report for the twelve months ended 31st of March, 1914.

Up till the 31st of December, 1913, the post of Editor was occupied by Dr. Wm. Macdonald, who then resigned. The writer was appointed Acting Editor pending a decision as to the future holder of the post. The writer also acted as Editor during the period that Dr. Macdonald was absent from South Africa on long leave—1st of April to 30th of September, 1913.

From the point of view simply of the education of our farmers the wisdom of the policy of abolishing the subscription rate of two shillings per annum and distributing the *Journal* free of charge, referred to in the last report of the Editor, has been further exemplified during the year under review by the steady increase in the circulation of the *Journal*. The circulation immediately prior to the abolition of the subscription rate was:—

English edition	...	...	...	...	19,000
Dutch edition	...	...	...	...	2,500

On the 31st of March, 1914, the figures were:—

English edition	...	...	...	...	32,000
Dutch edition	...	...	...	...	13,000

Satisfactory though the circulation may be, the other side of the question—namely, the cost of the *Journal*—leaves much to be desired, and, indeed, calls for serious consideration. The cost of printing the *Journal* during the year ended 31st of March, 1914, was:—

English edition	...	...	...	£6,945	9	9
Dutch edition	...	...	...	£3,314	15	6

The revenue derived from advertisements during the same period was:—

English edition	...	...	...	£2,386	15	7
Dutch edition	...	...	...	£531	4	1

Whilst, therefore, the revenue derived from advertisements has increased in twelve months by not quite 10 per cent., the nett cost of printing the *Journal* has increased by over twenty-five per cent.

It is quite evident that, in present circumstances, advertisements cannot be expected to defray more than the present proportion of the cost of printing the *Journal*; indeed, experience appears to show that the nett cost of printing will steadily increase so long as no subscription rate is charged.

A solution of the difficulty would appear to be to levy a subscription rate of five shillings per annum all round (within the Union). This was found to answer admirably in the case of the *Natal Agricultural Journal*, where fully half of the farmers in the Colony were subscribers.

In December, 1913, it was decided by the Minister that a certain proportion of the articles in the *Journal*—those of a more popular nature—should in future be translated into Afrikaans, instead of (as has hitherto been the practice) into the official Dutch. This has been regularly carried out since, and several letters of appreciation of the change have been received from our Dutch readers.

Efforts are continually being made to eliminate the use of too technical language in *Journal* articles, but the difficulties in this connection are obvious. What appears to the man of scientific training to be perfectly clear and straightforward language is inclined to be unintelligible to the average farmer, and



it is, perhaps, not a simple matter for a scientist, in discussing a more or less abstruse subject, to use simple language fluently and effectively. The more experienced of the Department's experts are, however, accustoming themselves to the requirements of the *Journal*, and the result is an added interest which attracts and holds many a reader who formerly could not possibly derive full benefit from our articles.

Some useful discussions have taken place in the pages of the *Journal*, contributed to largely by readers. South Africa possesses a considerable number of observant and intelligent farmers. The peculiar conditions of South African farming have developed a high degree of self-reliance, and this in turn has gone far to produce men who are thinkers and careful observers. The readers' discussions in the *Journal* have resulted in the accumulation of a considerable amount of interesting and useful evidence, and views and experiences of farming problems have been published which cannot fail to prove helpful to other farming readers as well as to students.

A considerable number of reprints of articles were made from the *Journal* during the year under review, for distribution to inquirers. In addition, the following bulletins were published:—

- “The Problem of the Witch-weed,” by Prof. Pearson.
- “Composition of Crops and Feeding Stuffs,” by H. J. Vipond, Chief, Division of Chemistry.
- “A Manurial Experiment on Maize,” by H. J. Vipond, Chief, Division of Chemistry.
- “Fourth Congress of Delegates representing Co-operative Societies, Transvaal and Orange Free State.”

The *Science Bulletin* series received the following additions:—

- “Anatomy of *Acacia Mollissima*, Wild, etc.,” by Paul A. van der Byl, M.A.
- “A Study on a Mottled Disease of the Black Wattle,” by Paul A. van der Byl, M.A.
- “Olifants River Irrigation Scheme,” by Dr. C. F. Juritz.
- “Notes on some Indigenous and other Fodder Plants,” by Dr. C. F. Juritz, D.Sc., F.I.C.

H. J. CHOLES,  
Acting Editor, *Agricultural Journal*.

## APPENDIX XIII.

## LIBRARIAN.

## ANNUAL REPORT, 1913-14.

Pretoria.

The Secretary for Agriculture, Pretoria.

I herewith beg to submit my report on the Library for the year ending 31st March, 1914:

During September and October, 1913, the Library was removed from the Erasmus Buildings, Church Square, to the Union Buildings.

During the period under review 496 volumes were received; in addition to this 150 volumes were bound, thus making a total of 646 bound volumes against 354 similar volumes during the previous year. The total number of such volumes in the library now amounts to 3,934. Some 11,298 works are deposited with Division and School Libraries.

All binding for the library is now being done "free of charge" by the Prisons Department, the cost of material being borne by the Government Printing Works.

The number of periodical bulletins, etc., subscribed to, exchanged or received gratis was as follows:

1910.	1911.	1912-13.	1913-14.
1,023	1,067	1,166	1,192

Duplicate publications received and distributed to Divisions and Schools:	1912-13.	1913-14.
	814	1,375

The following books were circulated:

	1910-11.	1912-13.	1913-14.
Books ... ..	530	760	747
Periodicals ... ..	2,289	2,870	2,652

The number of visitors to the Library was:

1912-13	1913-14.
1,758	1,512

This decrease may be attributed to the removal of the Library from the centre of the town to Union Buildings. However, during the last three months the number of visitors has increased.

The correspondence amounted to 628 letters received and 671 letters sent out; of these 628 letters received, about 100 contained requests for the loan of books, which it is regretted had, in the main, to be refused. The present would, I venture to think, be an opportune time to initiate a circulating library to enable farmers in all parts of the Union to keep in touch with agricultural matters in general.

In December 1913, I visited the School of Agriculture, Grootfontein, and classified, catalogued and arranged on shelves, the books belonging to the School Library. This now contains some 700 volumes.

The Library at Potchefstroom was also inspected during the past year.

The staff of the Central Library consists of: Librarian, Clerical Assistant, and Messenger.

The expenditure under items N1 and 3 of Vote 6 was as follows:

N1	Salaries	...	...	...	£350	17	3
	Bonus to Librarian	...	...	...	30	0	0
N3	Incidental Expenses, Purchase of Books, etc.	...	...	...	1,295	3	4
					£1,676	0	7

As in previous years, books have been lent to the public on payment of a deposit sufficient to cover the value of the works borrowed. The amount on hand from these deposits is £9 5s. 0d.

PAUL RIBBINK,

Librarian.





## APPENDIX XIV.

## DIVISION OF CO-OPERATIVE SOCIETIES.

ANNUAL REPORT, 1913-14.

Pretoria.

The Secretary for Agriculture.

In submitting the Report of this Division for the period 1st April, 1913, to 31st March, 1914, I wish to observe, for the information of the public, that the activities of the Division embrace the establishment and supervision of Co-operative Agricultural Societies registered under Act No. 17 of 1908 (Transvaal) and Act No. 1 of 1910 (Orange Free State), to the exclusion of organisation of various kinds carrying on business on Co-operative lines in the several Provinces of the Union under some other form of constitution.

It should further be stated that the Report has been prepared in consultation with the Registrar, Mr. C. H. Keet, who has been obliged, as the result of ill-health, temporarily to relinquish his duties.

One Society has been removed from the Register during the period under review, namely, the Pretoria Boeren Co-operative Vereniging, which was dissolved by Order of the Supreme Court of South Africa (Transvaal Provincial Division) on the application of the Directors.

Difficulty had been experienced in inducing the members to contribute their respective shares of the losses that had been sustained, and it was therefore decided to dissolve, and to form a new Society from among those members who felt that, relieved of its burden of debt, the Pretoria organisation would prove successful.

The following new Societies have been registered:

Pretoria Landbouw Koöperatieve Vereeniging.  
 Vredefort Koöperatieve Landbouw Vereniging.  
 Vredefort Koöperatieve Tabaksplanters Vereniging.  
 Bethlehem Koöperatieve Landbouw Vereniging.

As a means of ascertaining the progress of Agricultural Co-operation under the two Acts, variations in the total membership of all registered Societies cannot be considered a true guide, for the reason that included in the Register are usually a number of Societies which conduct no business, and take no practical part in the movement. The membership of Societies actively engaged in the transaction of business affords a more reliable indication, and it is proposed in future to include only operative Societies under this heading.

The statement below shows the number of members attached to such organisations at the 31st March, 1914. It will be observed that the total membership has increased by 621 during the twelve months.

## PROGRESS MADE BY INDIVIDUAL SOCIETIES.

Taking into due consideration the long-continued period of drought through which the country is passing, and the adverse effect it has had upon the quantity of produce available for disposal, the Societies, as a whole may fairly be considered to have done remarkably well.

From a financial point of view they have, with few exceptions, materially strengthened their position, and it is necessary that they should do so, for it is only in proportion to the degree of stability they attain that such organisations may be expected to exert a stimulating influence upon the development of the agricultural industry and the economic interests of the farmer.

As in previous years, Societies have been asked to furnish a statement of business transacted during the calendar year, and the figures in the statement below may be accepted as substantially correct.

[U.G. 2—'15.]

## BETHAL LANDBOUW CO-OPERATIEVE VEREENIGING.

The Balance Sheet and Profit and Loss Account of the Bethal Society for the 11 months ended 31st May, 1913, show a net profit of £579 15s. 2d., and a total Reserve of £1607 17s. 8d., being £277 10s. derived from Entrance Fees and £1,330 7s. 8d. total profits. In addition, the value of the Society's property and buildings appears at £4,799 4s. 11d. as against an original cost price of £5,914 14s. 11d., or a reduction of £1,115 10s. for depreciation. But the outstanding accounts due to the Society amount to a very considerable sum, and the provision made (£400) for bad and doubtful debts would appear to be based upon a very optimistic estimate of the risks involved.

An Inspector of the Division has recently conducted an investigation of the Society's affairs, and his report is such as to convey a clear indication that in many respects the lines upon which the business of the Society is being conducted might with advantage be changed, and that any delay on the part of the Directors in effecting such change is calculated to retard the future prospects of the Society.

An extract from the Report in question was duly forwarded to the Society, together with such further observations as were required to enable the Directors to appreciate the position in regard to such matters as required adjustment.

## CENTRAAL-WESTELIKE CO-OPERATIEVE LANDEBOUW VEREENIGING.

The net profit earned by this Society for the year ended 31st May, 1913, was £485, in addition to which Entrance Fees and previous profits represent a total Reserve of £1,195 11s. 11d. A sum of £725 4s. 9d. has been written off for depreciation of property and buildings against an original value of £2,746 12s. 4d.

Although, for reasons which will later be explained, it has not been possible to subject this Society to an investigation of its affairs for some considerable time, I feel fairly confident that it is making very good progress.

## ERMELO CO-OPERATIEVE VEREENIGING.

A further profit of £938 8s. 6d. in respect of the operations for the twelve months ended 31st December, 1913, has placed this Society in a very strong financial position, the total Reserve being now £2,368, or £18 a member.

In the case of this Society, too, an inspection has not recently been made, but there is little doubt that the business is very well conducted.

## HEIDELBERG CO-OPERATIEVE LANDBOUW VEREENIGING.

A detailed inspection has not been made by this Division for a considerable period. For the year ended 30th June, 1913, working operations showed a profit of £191 18s. 1d., but as the result of the failure of one of the Society's debtors, a loss of £486 9s. 6d. was incurred, reducing the total balance to credit of Profit and Loss Account to £54 0s. 10d. The Reserve Fund now amounts to £1,023 0s. 2d.

From the information available, the position of this Society would seem to be highly satisfactory.

## HOOGVELD EENDRACHT BOEREN KO-OPERATIEVE VEREENIGING.

The position in which this Society finds itself is a very strong one. During the year ended 30th June, 1913, a net profit of £1,744 11s. 9d. was made, a considerable increase as compared with the previous twelve months.

The Reserve Fund now amounts to £3,885 9s. 7d., and in addition a sum of £1,651 1s. 3d. has been set aside for depreciation on buildings, the original cost of which was £6,111 13s. 0d.

Indications point to further progress being shown at the end of the current year, and the Society affords a good illustration of the advantages to be derived from Agricultural Co-operation when its guiding principles are carefully observed.

## KOSTER CO-OPERATIEVE LANDBOUW VEREENIGING.

Recent developments in respect of the Koster Co-operative Landbouw Vereeniging are not of quite so satisfactory a nature as could be wished.

The Balance Sheet for the year ended 30th June, 1913, shows a fairly sound financial position, but the Society has not yet succeeded in accumulating any

material reserve, and in consequence of the payment of unduly high advances to members during the current maize season, difficulties of a nature similar to those that have proved disastrous to other Societies may arise. The dangerous feature in respect of such high advances is this, that if the members be called upon to refund the excessive payment, they lose confidence in the Society, while the alternative course of debiting the general funds has an equally depressing effect upon the future prospects of the Society.

#### KRUGERSDORP EN DISTRICT LANDBOUWERS CO-OPERATIEVE VEREENIGING.

It will be observed from the following Summary of Transactions that the Krugersdorp Society has conducted very little business during the past twelve months.

A Balance Sheet for the financial year ended 31st July, 1913, has not yet been furnished, but the position, it is understood, remains substantially the same as that indicated in the Report of this Division for the period ended 31st March, 1913.

The Society has been advised to dissolve, and it is probable that that course will be taken within a month or two.

#### DE LICHTENBURG CO-OPERATIEVE LANDBOUW MAATSCHAPPIJ.

The last available Balance Sheet and Profit and Loss Account signed by the Society's Auditor, is in respect of the year ended 31st May, 1913, and shows a balance to credit of Profit and Loss Account of £2,769 1s. 9d. It was resolved that of this, £1,000 should be placed to reserve, and the balance distributed amongst the members, but for some reason which it is difficult to understand £2,368 6s. 4d. was disposed of in this manner. Subsequent investigations conducted by this Division disclosed that in point of fact members had been paid about £100 more than the actual profit which, on re-adjustment of accounts, was found to be less than the amount shown in the Balance Sheet.

The difficulties of the Inspector were increased on account of the books of the Society being very much in arrear, a matter which has now received the attention of the Directors.

From every point of view the practice adopted by the Lichtenburg Society in regard to the distribution of profits is to be deprecated. It involves a hand-to-mouth existence, which any unforeseen loss is likely to bring to an abrupt termination, since the Society is dependent solely upon a reserve of £1,143, being entrance fees, for its protection.

When the profits are high there may be some justification for a partial distribution of profits, but the advantages to be derived from a gradual accumulation of reserve funds and the freedom from financial cares so afforded should not be overlooked.

#### LYDENBURG KO-OPERATIEVE LANDBOUW VEREENIGING.

The net profit for the year ended 30th June, 1913 was £1,563 13s. 6d., an increase of £662 17s. 11d. over the previous year. The total reserve is £2,828 12s. 4d.

The Society is conducted on eminently sound lines, and is proving of enormous value to the farmers by reason of the high prices it is realising for their produce.

#### DE MAGALIESBERG CO-OPERATIEVE TABAKSPLANTERS VEREENIGING.

The rapid accumulation of Reserve Funds effected by this Society has justified a more liberal scale of payment to members for their tobacco, and accordingly the Society has retained only £672 18s. 7d. as its share of the proceeds of the sale of 3,464,514 lbs. of tobacco during the financial year ended 31st January, 1914. With the addition of that sum the Reserve Fund amounts to £9,645 19s. 8d.

Appreciating the fact that the supply of tobacco has exceeded the local demand, the Society has decided to despatch a representative to Europe with a view to finding an oversea market.

#### MARICO BOEREN KO-OPERATIEVE VEREENIGING.

This is a small Society which is paying its way, but has not yet succeeded in effecting any material saving.

It would do well to restrict the facilities at present afforded to members for the purchase of goods on credit.

[U.G. 2—'15.]



## MIDDELBURG LANDBOUWERS CO-OPERATIEVE VEREENIGING.

Financial year ended 30th June, 1913. The Profit and Loss Account shows a net profit for the year of £606 11s. 11d., as compared with £360 1s. 2d. for the previous twelve months.

The Society has a total reserve of £1,753 13s. 1d., and is a sound and steadily improving organisation.

## OLIFANTSRIVIER CO-OPERATIEVE DORSCHWERK.

Threshing operations for the year ended 31st December, 1913, resulted in a profit of £9 19s. 7d., as compared with £211 17s. 7d. earned in the previous year. This may be attributed to a reduction of the charge made by the Society for threshing. The Reserve Fund amounts to £1,183, a very satisfactory figure.

## POTCHEFSTROOM CO-OPERATIEVE LANDBOUW VEREENIGING.

The present circumstances of the Potchefstroom Society support the view presented elsewhere in this Report in regard to the necessity of more frequent inspections by Government officials.

The various causes that contributed to the unsatisfactory position referred to in the previous Report of the Division all arose during the interval between two visits of the Inspectors, and might have been avoided, or at any rate considerably modified, had it been possible to effect more regular inspection.

The Balance Sheet for the year ended 30th June, 1913, has recently been submitted, and shows a deficit of no less than £18,564 9s. 0d. A pessimistic view has perhaps been taken of the outstanding accounts due by members, amounting to £34,233, in respect of which nearly £11,000 has been provided to meet bad and doubtful debts.

The position is highly unsatisfactory, and although the turnover which the Society is in a position to command is sufficient to render a recovery possible, if the members remain loyal, the best efforts of all concerned will be required to avoid a catastrophe.

## PRETORIA LANDBOUW KO-OPERATIEVE VEREENIGING.

This Society was registered on the 17th July, 1913, and is composed principally of members of the Pretoria Boeren Ko-operatieve Vereeniging now in course of liquidation.

A Balance Sheet and Profit and Loss Account in respect of the seven months ended 28th February, 1914—the close of the financial year—has not yet been submitted, but it is understood that a loss will be shown.

From an administrative point of view, the Society is well conducted, but it would appear that unless a substantial increase can be effected in the turnover, it will have difficulty in making ends meet.

## RUSTENBURG BOEREN KO-OPERATIEVE VEREENIGING.

As the result of a decision to close the financial year at the 30th September instead of 31st December as heretofore, the last available Auditor's Report, Balance Sheet, etc., covers a period of nine months only, from the 1st January to 30th September, 1913. For that period a profit of £554 14s. 1d. is shown, but of this only £177 14s. 1d. represents the profit on actual working, the balance being subscription fees charged against members. Including this sum of £554 14s. 1d., the Reserve Fund amounts to £1,359 15s. 6d., but the Auditor remarks that subscription fees to the total value of about £200 have been debited against members who have not even paid their entrance fees, and that the value of the Reserve Fund in so far as it includes such unpaid subscriptions and entrance fees is problematical.

Attention is also drawn to the fact that in the giving of credit the Directors delegate their functions to the Secretary. Experience confirms the observation of the Auditor that however competent and reliable a particular Secretary may be, the practice is an undesirable one.

The Society has disposed of a large quantity of cotton seed to its members, and in view of the fact that the Rustenburg District is considered to afford favourable conditions for the successful growing of cotton, the result of the experiment is awaited with interest.

## STANDERTON CO-OPERATIEVE BOEREN VEREENIGING.

A material reduction in the working expenses from £2,735 to £2,058, and an increase in receipts, has enabled the Society to show a profit for the year ended 31st March, 1913, of £357 9s. 8d. Bearing in mind the fact that the effect of drought was particularly severe in the Standerton District, and that as a direct consequence thereof only 26,432 bags of maize were handled during the financial year, as compared with 45,882 in 1911-12 and 69,114 in 1910, and that a corresponding reduction is shown in other produce, this result is highly creditable.

At the 31st March, 1912, the Society showed a debit balance of £5,032 1s. 6d., but the appointment of a capable Manager has had considerable effect upon the prospects of the Society, and as anticipated in my previous report a rapid recovery has been effected. Members have contributed to the loss a total sum of £4,070, so that the present debit is £924 10s. 5d. But this amount will be further reduced as the result of the operations of the year just ended, and the general conduct and management of the Society is now such as to warrant every confidence in its future.

## VREDE KO-OPERATIEVE LANDBOUW VEREENIGING.

Financial year ended 30th June, 1913. Profit and Loss Account shows a credit balance for the year of £309 2s. 1d. The Reserve Fund is £459 9s. 7d. From an inspection conducted by one of my Inspectors, it would appear doubtful whether this organisation is really fulfilling in all respects the true functions of a Co-operative Society as defined by Act No. 1 of 1910 (Orange Free State).

The Directors would be well advised to confine the operations of the Society more strictly within the limits laid down in that Act, and to deal only with produce actually grown by its members.

## WATERBERG LANDBOUWERS KO-OPERATIEVE VEREENIGING.

The general utility of the Co-operative Movement in the Waterberg District continues to be discounted to a considerable extent by reason of the drought.

In the circumstances the Waterberg Society has made as good progress as can be expected.

At the 31st August, 1913—the end of the financial year—the Profit and Loss Account showed a credit of £74 11s. 2d., which, with entrance fees, forms a total reserve of £470 14s. 9d.

## WOLMARANSSTAD CO-OPERATIEVE LANDBOUW VEREENIGING.

Attention is drawn by the Auditor to the fact that during the financial year ended 30th June, 1913, only one-half of the members delivered grain to the Society. Nevertheless, after a very inauspicious beginning, this organisation has developed into a very promising Society, for which a bright future may confidently be anticipated. During the period referred to a profit was made of £470 16s. 1d., while the Reserve Fund is shown at £771 16s. 1d. Since then an additional profit of £200 has been made.

An encouraging feature in connection with this Society is the gradually increasing quantity of wool with which it is being called upon to deal, as the result of the satisfactory prices it is obtaining for the members.

On the other hand, the advances made on mealies during the current year are higher than they can reasonably be expected to realise, and this will probably involve some difficulty in adjusting satisfactorily.

## ZOUTPANSBERG KO-OPERATIEVE LANDBOUW VEREENIGING.

The result of the operations of this Society for the financial year ended 30th June, 1913, is not such as to necessitate any modification of the opinion expressed in the previous Report of this Division that dissolution should be effected. Although a small profit of £11 10s. 2d. was made, there is no indication that any permanent improvement will take place, and so far as can be seen at present the financial statement for the current year will probably show a further small loss.

Meetings are now being held with a view to obtaining the views of the members on the question of discontinuing operations, and if, as is likely to be the case, the members approve of such action being taken, the Directors will apply to the Supreme Court for dissolution.

[U.G. 2—'15.]

**SUMMARISED Statement of Transactions of Co-operative Societies during the year ended 31st December, 1913, and numbers of Registered Members as at 31st March, 1913, and 31st March, 1914.**

Name of Society.	Transactions during the year ended 31st December, 1913.			Number of Registered Members.	
	Mealies sold.	Value of other produce sold.	Value of Machinery etc., sold, to Members.	31st, March, 1913.	31st March, 1914.
	Bags.	£	£		
Bethal Landbouw Co-operatieve Vereeniging .. .. .	115,000	2,484	15,721	526	533
Centraal-Westolijke Co-operatieve Landbouw Vereeniging .. .. .	56,919	347	13,797	463	513
Ermelo Co-operatieve Vereeniging .. .. .	12,000	2,300	9,000	93	130
Heidelberg Co-operatieve Landbouw Vereeniging .. .. .	26,000	5,036	4,849	194	183
Hoogeveld Eendracht Boeren Ko-operatieve Vereeniging .. .. .	89,537	8,892	13,025	500	567
Koster Co-operatieve Landbouw Vereeniging .. .. .	5,105	3,030	10,247	696	820
Krugerdsdorp en District Landbouwers Co-operatieve Vereeniging .. .. .	747	31	88	209	206
De Lichtenberg Co-operatieve Landbouw Maatschappij .. .. .	84,445	5,364	21,798	1,115	1,297
Lydenburg Ko-operatieve Landbouw Vereeniging .. .. .	14,580	8,500	2,000	185	217
De Magaliesberg Co-operatieve Tabakplanters Vereeniging .. .. .	—	(a)	—	1,872	2,398
Marico Boeren Ko-operatieve Vereeniging .. .. .	776	4,582	5,991	291	321
Middelburg Landbouwers Co-operatieve Vereeniging .. .. .	76,000	2,137	23,380	723	721
Olifantsrivier Co-operatieve Dorschwerk .. .. .	—	—	—	191	193
Potchefstroom Co-operatieve Landbouw Vereeniging .. .. .	80,000	15,000	11,000	1,615	1,439
Pretoria Landbouw Ko-operatieve Vereeniging .. .. .	1,463	2,511	873	—	86
Rustenburg Boeren Ko-operatieve Vereeniging .. .. .	600	3,742	11,083	652	811
Standerton Co-operatieve Boeren Vereeniging .. .. .	25,617	4,242	13,800	394	452
Vrede Ko-operatieve Landbouw Vereeniging .. .. .	29,754	11,179	20,784	215	388
Waterberg Landbouwers Co-operatieve Vereeniging .. .. .	4,848	1,604	2,991	333	321
Wolmaransstad Co-operatieve Landbouw Vereeniging .. .. .	15,895	5,602	12,257	220	206
Zoutspansberg Ko-operatieve Landbouw Vereeniging .. .. .	166	850	1,000	394	377
Society now in liquidation. .. .. .	—	—	—	677	—
Totals .. .. .	639,452	87,433	193,684	11,558	12,179
Totals for the Calendar Year 1912	879,000	104,000	167,000	—	—

(a) 4,465,103 lbs. of tobacco were delivered by members during the year ended 31st December, 1913, and 3,464,514 lbs. were sold, as against 2,496,635 lbs. sold during the previous year, the average price obtained being approximately 6d. per lb.

**CENTRAL AGENCY FOR CO-OPERATIVE SOCIETIES, LIMITED.**

The loss incurred during the two years immediately following the taking over from the Government of this Agency, which loss amounted to several thousand pounds, has been recovered, and this Institution is now acquiring a sound financial footing. Certain Societies do not support it so loyally as could be wished, but steady progress is being maintained, and the Agency is exercising valuable consolidating influence upon the district associations.

**LAND BANK AND OTHER LOANS.**

A statement published by the Land and Agricultural Bank of South Africa shows that at the 31st January, 1914, the total amount due to that Institution by Co-operative Societies in respect of advances was £297,323 15s. 11d. Several Societies continue to obtain their banking facilities, either wholly or in part, from private Banks.



It may be mentioned that the loans raised by the Societies usually take the form of floating overdrafts, which fluctuate in amount to a considerable degree according to the particular season of the year.

#### LAND BANK GUARANTEES.

It is provided by Act No. 18 of 1912 that the Land and Agricultural Bank may guarantee the due performance of contracts entered into by Co-operative Societies, or by the Central Agency on behalf of Societies, and in this connection a difference of opinion exists between the Bank and the Central Agency. The former Institution contends that the Land Bank Act imposes upon it the burden of investigating the books and accounts of the Agency before issuing such a guarantee, while on the other hand the view taken by the Board of Directors of the Central Agency is that the Bank is indemnified by the Societies for any losses it may sustain, and that as the Agency has no financial interest in the performance of the contract, there is no necessity for the Bank to concern itself with the affairs of the Agency, which is a private company; and further that there is nothing in the Land Bank Act to confirm the attitude of the Land Bank.

In the absence of any disposition on the part of either body to waive its objections, the Central Agency has for some considerable time obtained all its guarantees from other sources.

#### FOURTH CO-OPERATIVE CONGRESS.

The fourth Congress of representatives of Co-operative Societies in the Transvaal and Orange Free State was held in Pretoria on the 11th February, 1914.

The attention of the delegates was mainly devoted to the proposed new Co-operative Act, the general terms of which were submitted for consideration.

An interesting discussion subsequently took place on the question of the organisation of the wool trade, and terminated in the appointment of a strong Committee to enquire into the best means of developing that particular branch of the business of the Societies.

#### EXTENSION OF MOVEMENT TO OTHER PROVINCES.

Frequent applications continue to be addressed to the Division by farmers of the Cape and Natal Provinces, for advice as to the best manner in which to establish Co-operative Agricultural Societies in their particular districts, but in the absence of any definite information as to the probable date of submission to Parliament of the new Co-operative Bill, it has not been found possible to attempt any extension of the movement beyond the borders of the Transvaal and Orange Free State.

#### AGRICULTURAL CO-OPERATION IN THE ORANGE FREE STATE.

The remarks contained in the Report of this Division for the year ended 31st March, 1913, in regard to agricultural co-operation in the Orange Free State, continue to apply, for although three new Societies have recently been registered under Act No. 1 of 1910 (Orange Free State) they have not yet commenced operations, and the movement is therefore represented by one active Society only.

Prior to the establishment of the Transvaal Societies, a Government official devoted himself exclusively, for a period of about a year, to the work of explaining the principles of Co-operation to the farmers, and organising them in such a manner as to permit of a simultaneous movement being made from all parts of the Province. But the Free State has not had this advantage, and although the farmers display the liveliest interest in the subject of Co-operation, it does not appear likely that any considerable progress will be made until such time as they are afforded facilities for undergoing a similar preparatory course.

So far as possible the attention of the Division has been given to educational work of this nature, but the calls made by the Transvaal Societies upon the services of the various officers have not permitted of a comprehensive campaign being conducted in the Free State.

#### INSPECTION OF CO-OPERATIVE SOCIETIES.

The conditions under which the inspection of Co-operative Societies is being performed render it very difficult to ensure effective supervision of their affairs.

[U.G. 2-'15.]

The number of Inspectors now employed—there are only two—is clearly insufficient to secure regular and competent investigation of the books of all Societies, and the result is that in devoting attention to the weaker organisations the claims to similar treatment of other Societies have had to be neglected.

In this connection I beg to refer to the Registrar's Minute dated 25th November, 1913, from which the following is an extract:

“The danger to Co-operative Societies lies in the fact that from the nature of the business transacted the effect of inefficient management is not immediately discernible. Inherent weakness cannot be detected by casual enquiry. Balance sheets may conceivably fail to reflect the true position for the reason that below such matters as an Auditor is accustomed to investigate may lurk concealed such evidence of mismanagement as may alter the whole position of affairs. I venture to prophesy that this incipient decay will seal the doom of the Co-operative Movement in this country unless immediate action be taken to arrest it.

“The history of Agricultural Co-operation in the Cape and elsewhere affords conclusive evidence that a system of careful inspection by persons thoroughly versed in the intricacies of the particular business transacted is essential to its success. The absence of such inspection in the Cape scheme was admitted to be one of the immediate causes of failure, and to the same cause may fairly be attributed the non-success of a number of Transvaal Societies. It will be remembered that whereas the Transvaal Co-operative Movement was initiated in 1908, some considerable period elapsed before any Government Inspectors were appointed, and it may safely be said that during that period the majority of the Societies then in existence had reached the verge of bankruptcy. Of all Societies that have ceased operations on account of financial difficulties, I cannot recall one in respect of which the first note of warning that all was not well was not sounded by the Government Inspectors, and almost without exception an outstanding feature of such warning was its unexpectedness to those responsible for the control of the particular Societies concerned.

“It is my firm opinion that had a sufficient staff of Inspectors been appointed in 1908, the likelihood of complete failure of any of the Societies would have been remote.

“The danger to-day, though not so imminent as in 1909, is very real. With the staff at my disposal it is impossible for me to maintain such regular and thorough control of the affairs of all Societies as is essential, with the result that many of them are being neglected, and the longer they are so neglected the more disastrous will be the effect of any irregularities or mistakes which may be occurring in connection with such Societies.

“The position is becoming more and more critical by reason of the fact that while the membership and transactions of Societies are rapidly increasing, the staff of the Co-operative Division has been reduced.

“There is no doubt in my mind that urgent necessity exists for instituting at once a really effective system of inspection. By what particular Department the work is performed is immaterial, if it be thoroughly done. Delay in taking such action will result in the liquidation of Societies, with serious loss to many farmers who, in becoming members, were largely influenced by the assumption that their interests would be adequately safeguarded by the system of Government Inspection employed.”

#### OFFICE ACCOMMODATION.

In conclusion I wish to express the hope that an early opportunity will present itself of removing the members of the Division to more suitable offices. Situated in the basement of Union Buildings, the accommodation provided was intended for the storage of official documents and not for permanent occupation by officers. The atmosphere is stuffy and depressing, and is likely to be highly prejudicial to the health of the staff.

A. E. MARKS,

Acting Registrar of Co-operative Agricultural Societies.

## APPENDIX XV.

## REGISTRAR OF BRANDS AND CONTROLLER OF FENCING.

ANNUAL REPORT, 1913-14.

Pretoria.

The Secretary for Agriculture.

I have the honour to submit the following report on the work of this Division for the year ending March 31st, 1914.

During the year six hundred and ninety-two Brands were registered in the Transvaal Province, one hundred and eighty-two in the Cape Province and fifty in the Orange Free State, and nine hundred and five Branding Irons were supplied. £245 was collected for registration fees and Branding Irons to the value of £491 were supplied at cost price.

## BRANDS DIRECTORIES.

*Transvaal.*—The 9th Edition of the Annual Brands Directory was published and distributed in accordance with the requirements of Section 11 of the Great Stock Brands Ordinance of 1914. Quarterly returns were prepared and published regularly and the 10th edition, covering the period January to December, 1913, was prepared and checked and is now in the hands of the Government Printer for publication.

*Cape.*—Quarterly returns were published regularly, but owing to the fact that the old Cape Government did not compile annual directories for some years prior to Union, it has not been found practicable to prepare a complete list of all the Brands registered for that Province. The compilation of such a Directory at this juncture would involve labour and expenditure quite disproportionate to the value thereof.

*Orange Free State.*—In addition to the quarterly returns published and distributed regularly, the 1912 edition of the Directory was printed and that for 1913 prepared, checked and submitted to the Government Printer for publication.

The inspection of all fences for which loans had been granted under the provisions of the Voluntary Fencing Acts No. 12/08 (Transvaal) and 20/10 (Natal) was completed and the Inspectors transferred; one to the Veterinary and one to the Division of Sheep. The Depôts at Machadodorp and Pretoria were closed.

Nine hundred and fifty-eight applications were dealt with under Act No. 17 of 1912. In terms of Section 5 contributions towards the cost of dividing fences were declared obligatory in thirty-three Wards in the Cape, eighteen in the Transvaal, and five in Natal Province.

The following will serve to show the work done in connection with Act 38/04 (Transvaal):

Number of farms accounts made up ...	...	14
Schedules prepared ...	...	867
Bonds registered ...	...	867
Bonds cancelled and substituted ...	...	80
Queries in respect of Bonds replied to ...	...	260
Deeds Particulars obtained ...	...	190

The above has reference to fences erected prior to the coming into force of the new Act and represents the practical completion of the work in respect thereof. The only matter now still outstanding in connection with the operations under the old Act being the settlement of disputes relative to the charges noted against a fairly large number of farms in the Piet Retief District.

Under Section 9 of Act 17 of 1912 nineteen farms in the Transvaal and thirty-seven farms in Natal were ordered to be fenced.

With the exception of two farms in the Transvaal and three in Natal, all the owners were induced to erect the fencing themselves, which is very satisfactory, but it is regrettable that in the majority of cases, more especially in the latter Province, the persons concerned did not appear to realise the gravity of the



situation and constant pressure had to be brought to bear upon them to effect completion of the fences within a reasonable period from the date of receipt of the relative order. In some cases it took six, seven and more months to get the fences up, and my experience in this connection leads me to suggest that in any future amendment of the Act, which, I understand, is contemplated in the direction of including vermin-proof fences in the definition of a fence, the question of making unnecessary delays in complying with the Minister's order a punishable offence merits serious consideration.

Completion was effected of the fences around Mlaklakas Location and Paardekraal Settlement in the Kingwilliamstown and East London Districts, respectively, ordered in the previous financial year.

During the period under review the following expenditure was incurred in connection with the erection of new and maintenance of existing fences:

New Fences (including Mlaklakas Location and Paardekraal Settlement, ordered in Financial Year, 1912-13)	£1,762	6	8
Repairs to East Coast Fever Fences in the Cape Province	53	10	0
Repairs to East Coast Fever Fences in the Transvaal Province	3	4	4
	£1,819	1	0

of which £1,762 6s. 8d. is recoverable in full, in terms of Section 10 of the Act.

The applications, under the Dipping Tanks Act, No. 20 of 1911, which were dealt with from the 1st October, 1913, to 31st March, 1914, numbered two hundred.

I have the honour to be, Sir,

Your obedient Servant,

W. J. NUSSEY,

Registrar of Brands.

## APPENDIX XVI.

## DIVISION OF DRY-LAND FARMING.

ANNUAL REPORT, 1913-14.

The Secretary for Agriculture, Pretoria.

*Office Work and General Correspondence.*—During the period under review, 2,567 letters were despatched and 2,409 received. Having had no clerical assistance I was, on many occasions, compelled to attend to the office work and decline numerous applications for my services from Farmers' Associations and other public bodies throughout the Union. Under these circumstances also the work of our Co-operative Experiments suffered greatly. Provision has, however, been made on the Estimates, 1914-15, for assistance which I trust will enable us to pay more attention to the more important practical problems of immediate concern to agriculturists and to research work.

*The Programme of Work* that was laid down (under 7 sections) in last year's report has been followed out in so far as I was able to cope single handed with such items as Co-operative Experiments, Travel, Investigations, Lectures and Field Demonstrations. Applications for Co-operative Dry-land Experiment Stations, under Government Notice No. 195 of 1913, were received from nine municipalities and other public bodies throughout the Union.

*Government Dry-land Experiment Stations.*—Although the period under review has been one of exceptional drought, I am pleased to state that the Government Dry-land Experiment Stations have made great progress in demonstrating to the farmers what can be done by careful and timely preparation of their ground, thereby conserving the largest amount of soil moisture. We have also shown the great value of planting drought and rust resistant cereals and plants and getting fair yields on a poor soil and under adverse conditions.

One of the most encouraging features of the year's work is the ever increasing interest which the farming community in general is displaying in this branch of agriculture and numerous were the reports of dry-farming successes received during the period under review even from the dry zones of the Union. It was surprising to find good dry-land wheat crops growing at places like Nooitgedacht, and other farms near De Aar Junction, while a Senator Marks' dry-farming prize was awarded to Mr. I. du Plessis, in the Philipstown District, and also one to Mr. Chatterton, in Southern Orange Free State, for wheat and forage grown by them. Mr. J. Burtt-Davy, in his annual report of last year, makes the following remark about the maize crop, viz.: "Men who have ploughed deeply and taken care to conserve the soil moisture, have again come out far ahead of those who merely followed the old method." This year, however, those in the Western Transvaal who have merely followed the old method have no crops. Although dry-farming methods in South Africa are gaining more followers every year, and the system is better understood than it was, at the same time it is obvious that too many farmers still have a confused idea with regard to the proper and timely preparation of the seed-bed, the conservation of soil-moisture, the selection of drought-resistant plants, etc., and too many farmers do not experiment enough for themselves on their own farms. Such experiments can be conducted on a small scale with practically no extra cost until such time when results obtained warrant that the successful crops be grown on a large and profitable scale.

*Visitors.*—Over 600 farmers from different parts of the Union, Rhodesia, Katanga, German West Africa, etc., visited the Lichtenburg Station, during the period under review. A number of farmers have also visited the other Government Stations at Vryburg, Warm Baths and Pietersburg.

The Division has also taken over the control of the Vryburg Dry-land Experiment Station, with Mr. H. A. Mellé, as Officer in Charge.

*Experiments.*—The results of the experiments conducted on the station will be found in the tabulated statements attached to this report.

Noteworthy Experiments may perhaps be the following:—

*Wheat (Black Don).*—A small sample of this variety was sent to me from the Don Territory, in Russia, some three years ago. It was claimed to be both drought-resistant and rust-proof. Small trial plots were planted on the Lichtenburg Station for the last three years (as winter and summer crops). But in order

to test the rust-resistant qualifications of the wheat I have at the time when same was received sent some small parcels to be tried as a summer wheat along the coastal regions. The several farmers who have tried the variety in question reported that for three summer seasons no rust was detected. At Lichtenburg we could not find a single spot of rust, but then the climate is very dry here. The "Black Don" is undoubtedly a very good drought resistant. An acre sown in November last on land (from which a week previously Chernouska wheat was reaped) matured in less than three months under a rainfall (during its growing period) of 1.72 inches. There was of course some moisture left in the ground from the October rain. The yield was 5 bags to the acre. "Black Don" is a typical Durum, the ear and awn is quite black, the seed is reddish-yellow and bread made from it, although not very white, is excellent.

Some six years ago, Mr. Davel, ex-member of Parliament for Graaff-Reinet, obtained some seed wheat from Mr. H. C. van Heerden, now Minister of Agriculture. This wheat, although not the same variety, resembles "Black Don" very much. The variety in question has been tried on small plots as a summer crop at Lichtenburg for two seasons with very good results. A true Durum and like "Black Don" (when sown in summer) matures in three months time from sowing, at Lichtenburg. Small parcels of this seed were at one time also sent to some farmers in our more humid climes and very good reports about the rust-resistant qualifications of this wheat were received.

"Chernouska" is not only among the most beautiful of the Durums, a good yielder and rust-resistant with large plump seeds, which make excellent bread, but it is undoubtedly also one of the best drought resistant. In 1912, five moisture acres on the Lichtenburg Station were planted with Chernouska, which reached maturity under a rainfall of 0.41 of an inch during the growing period, and yielded 5 bags to the acre. Mr. I. J. Marais, of Philipstown District, Mr. Grove, of Britstown, and others, grew excellent Chernouska Durum, during the dry weather spells of 1913.

*Triticum Dicocum Dicoccoides*, "Wild Palestine Wheat" or *The Ancestor of Modern Wheat*, was discovered some few years ago by Mr. Aäron Aäronsohn, head of the Jewish Agricultural Experiment Station of Haifa, at the foot of Mount Carmel. Mr. Aäronsohn, who is now working for the Governments of Canada and the United States of America, says among other things the following about this wild wheat: "It has also a wonderful rust-resistant power, and this power, being an inherent quality, can be transmitted to the hybrid cross-breeds we seek to evolve from it, by the selection and crossing of this wild cereal, which prefers *poor, shallow, dry soil*, and thrives without cultivation, we should be able to produce new races which will be very persistent and very hardy. In this way we can extend the cultivation of wheat to regions where it is at present impossible, owing to the low quality of the soil and the severity of the climate."

Last year I obtained, with great difficulty, a very small parcel of this "Wild Wheat." Small plots were laid down and planted in November. I have managed to cross some of this with "Polish Wheat" and "Chernouska," and hope to make the next (2nd cross) with "Medeah" and then try "Kufoid" Wheat. I still have a little pure "Wild Wheat" seed left and shall try to effect other crosses and keep some "Wild Wheat" seed pure. The wheat in question is certainly a great drought-resistant judging from the severe test it has been put through last summer.

"*Wisconsin Barley*" sent me some years ago from Wyoming by Dr. G. Langmann, has at Lichtenburg proved to be hardier against drought than "Chevalier," "Boer," or "Australian" barley.

*Kaffir Corn*. "Soudan Durra." This variety, heavy large heads with beautiful large white seeds, has proved to be of exceptional drought-resistant qualifications, and the Co-operative experiments reports from farmers fully bear this statement out.

*Lucerne* grows and yields much better under irrigation than on dry-lands, however, the "Arabian" variety has so far given best results. Five light cuttings per season was taken off a field at our Vryburg Station, notwithstanding the severe drought.

*Fruit Trees*, especially apples, seem to do very well on dry-lands.

*Rust-Resistant Oats*.—In the beginning of 1912, I obtained a small parcel of seed oats labelled "Hajira" from South America, through Dr. Langmann, of New York, U.S.A. It was stated that the variety in question was a rust-proof and therefore a good summer crop. The seed received was not enough for trials along the humid coastal regions of the Union. No rust was detected for two dry summers at Lichtenburg, and it was not my intention to mention this item until we have tested the same in moist climates, but while I was judging cereals at the Standerton Show in March last, I discovered that the identical variety was



exhibited by Mr. D. Lane of that district. The exhibit was made up of green sheaves of 12, 24, 36, and 40 inches high, sheaves on the point of ripening, ripe sheaves, and ripe seed in bags, all grown in midsummer. Not even under a magnifying glass could we detect any signs of rust. Mr. Lane informs me that he obtained a small quantity of this seed some years ago and that he has never (even during periods of heavy rains) found this variety in the least affected by rust. I have every reason to believe Mr. Lane, and his neighbours bear him out in detail. In some respects the "Hajira" resembles the red-straw Algerian Oats, but a closer inspection soon reveals that it is not the last named. Dr. Langmann informed me at the time that the oats originally came from Hajira, in Algiers.

*Travel, Investigations, Lectures, Field Demonstrations and Judging at Agricultural Shows.*—I have during the financial year under review visited 28 centres throughout the Union, in connection with the above.

RAINFALL: 1st APRIL—31st MARCH, 1914.

	Lichtenburg. Dry-land Stn.	Vryburg. Town.	Pietersburg. Town.	Groenkloof. Pretoria.	Warm-Baths. Dry-land Stn.
April .. .. .	1·31 inches	2·13 inches	3·03 inches	2·29 inches	1·56 inches
May .. .. .	Nil "	Nil "	0·63 "	0·10 "	0·04 "
June .. .. .	Nil "	Nil "	Nil "	Nil "	Nil "
July .. .. .	Nil "	Nil "	0·05 "	0·02 "	0·05 "
August .. .. .	Nil "	0·05 "	Nil "	1·03 "	0·67 "
September .. .. .	0·40 "	0·19 "	0·58 "	0·13 "	0·06 "
October .. .. .	3·15 "	2·13 "	1·19 "	4·40 "	4·33 "
November .. .. .	1·58 "	1·81 "	1·08 "	1·78 "	0·44 "
December .. .. .	2·12 "	0·31 "	2·41 "	3·04 "	2·98 "
January .. .. .	0·84 "	1·06 "	3·30 "	4·78 "	3·72 "
February .. .. .	2·45 "	4·19 "	7·65 "	2·59 "	2·90 "
March .. .. .	2·88 "	1·21 "	1·52 "	3·57 "	3·31 "
Total .. .. .	14·73 inches	13·08 inches	21·44 inches	23·73 inches	20·06 inches

From the above statement it will be seen that only the *total* rainfall for each month is given, and in some cases the total precipitation at the end of a month amounts to an inch or even more, which, at a glance, appears to be quite a good fall, but on carefully going through the Meteorological Registers it will be found that in most cases the rain fell in light isolated showers; for instance, the total fall for November (at Lichtenburg) was 1·58 which was scattered over the whole month as follows: 0·13, 0·38, 0·38, 0·09, 0·60, and during the whole of January, 2·45 inches was scattered as follows: 0·15, 0·21, 0·61, 0·26, 0·63, 0·09, 0·21, 0·29. Dry and hot stretches of weather were unusually common between such far apart showers.

*White Labour.*—This is by far the most expensive item in connection with our experiment stations, and by far the greater portion of the funds voted from year to year is spent on white labour. An encouraging feature, however, is that the white boys employed by us and also the public in general now fully understand that the object of the Department, by employing white boys, is to train such boys properly on the problems of the soil, and to get them out of the towns and back on the land. The number of applications from intelligent white boys during the financial year ending 31st March, 1914, was 92, and the number of applications from farmers and Estate Companies, etc., for the services of such boys for one year was 45; we were only able to place 5 boys, owing to the limited number employed by us. These figures are only for the Lichtenburg Station. White boys are paid £2 to £4 per month, according to their age and capability. Adults get 4s. per working day. These people have to find food, quarters, etc., themselves. Quite a number of such people so trained on our stations have found employment as foremen or managers on farms, and are no longer unemployed poor whites.

*General.*—A full exhibit of our dry-land crops was sent on request through the Commissioner of Customs and Excise to the Imperial Institute at South Kensington (England).

Many were the applications received for small parcels of seed from different parts of the world, and although we could not meet the demand, many small samples of different seeds were sent to Australia, Ceylon, Ashantee, Canada, East India, Hawaii, Algeria, etc. Good reports about our dry-land seeds and valuable seed samples were also received by us from the above places.

*South African Farming Methods.*—My work brings me in contact with thousands of farmers yearly and I find that "Up-to-date" farming methods have undoubtedly made great progress of late years throughout South Africa. It is, however, too obvious that many people who have been farmers all their lives (as

were their fathers before them) are no farmers at all. Some enlightened people again seem to think that given the land and some money, everybody can be a good farmer. It is hardly necessary for me to say that for farming, like for every other profession in life, common sense, study and training are needed. Among the white labourers on our dry-land stations were men who have been farmers for 25 years and longer who have frankly admitted that they knew nothing about the soil, climate conditions, etc. These men have again started farming for themselves with fresh energy, new interest and ideas. Some farmers do not study climatic conditions enough; for example: Different crop varieties mature at various periods, they therefore reach critical periods in their growth at different times throughout the season. The farmers must therefore study conditions of soil, climate, crop variety, etc., not only to get a good growth, but also to choose the best time for planting so as to arrange the most suitable period for the flowering and pollination stages of the various crops, and to escape early frosts, etc.

*Land Settlements* have not always been a success in South Africa, notwithstanding the fact that I daily come across vast stretches of beautiful, fertile land lying waste throughout the Union, land that can partly be irrigated and partly be dry-farmed; for instance, large areas along the Olifants River in the Transvaal. The colonists at Lagersdrift (under the Dutch Reformed Church) bring the water out of "Steelpoort" and "Sterkloop" spruits by means of "Draad Damme" (Wire Dams), huge loose boulders packed firmly together and enclosed in a strong net made of strong fencing wire and anchored on either side. Expensive irrigation works are not always or everywhere necessary. But my humble opinion is that failures in land settlements in the past were largely due to the fact that too many people "looking for a job" were supplied with land and money and were told to go on the land and be exemplary farmers, while many of such men had not an atom of a farmer in them. To make successful land settlers of poor whites living in our towns and villages, it will be necessary to employ them for a time on some Government or Co-operative Institution, to test their farming capabilities before they are allowed to take up Government land.

*The object of our Experiment Stations* is to conduct experiments, to find out new dry-farming truths, to advise farmers how to prepare their seed-beds, conserve the soil-moisture, when and how to grow profitable crops or trees, study their soil and climatic conditions, etc. And I am pleased to say that notwithstanding the fact that we were under staffed, or without a scientific staff, and could not attend to one-third of the calls from Farmers' Associations, etc., for lectures and demonstrations, we have nevertheless succeeded in helping a great number of farmers. It is evident from reports and statements that a great number of farmers have awakened to the important fact that they must also experiment for themselves on their own farms, and a number of really interesting experiments were conducted throughout the Union. More farmers are beginning to study their soil and climatic conditions, to realise the great importance of drought resistant crops, to prepare for a drought every year and to see the value of land hitherto considered useless. Also that rocky or gravelly land that cannot be ploughed can be planted with useful trees even if dynamite has to be used. And that the demands of the South African and the World's produce markets have to be studied even better than the Share Market if a real commercial success of farming is to be made. A great number of farmers have, during the period under review, gained more confidence in dry-farming methods and have shown not only better crop results, but also greater interest in this branch of Agriculture, and these farmers seeing the dry-farming possibilities previously unknown to them are beginning to realise that the land can bear and support a larger white population, and are trying to get some of their friends out on the land.

*The Crop Yields*, at the different Government Stations, have not been exceptionally high; however, notwithstanding the extraordinary dry season and other adverse conditions under which we had to work, most of our results obtained may safely (from a farmer's point of view) be termed "Paying Yields," and from an experimental point of view the word "Satisfactory" is not out of place. It will also be observed that our experiments were not conducted on a large scale, and that there were generally less total crop failures than was the case in previous years with a higher rainfall. This is due to the fact that we have had some little time not only to acclimatise certain crops and plants but also to obtain some drought-resistant seeds from elsewhere, and to select dominant varieties.

*Publications.*—A book, "Dry-Farming," written by me. A pamphlet, "Lucerne," written by Mr. H. A. Melle, Manager of the Vryburg Station.

HEINRICH S. du TOIT,

Government Dry-Land Agronomist.

Station.	No. of Draught Animals.	Other Live Stock.	Average No. of Labourers employed.	Total No. of Acres cultivated.	Total No. of Acres of Acres followed.	Total No. of Acres cropped with Experimental Crops.	Total No. of Acres sown with Green Manuring Crops.	Total No. of Acres sown with Feeding Crops for Draught Animals.	Total No. of Trees (shade or fruit) planted.	Approximate cost of Trees and of Planting.	No. of Plots laid out for Experiments.
LICHTENBURG {	50 oxen 5 mules 2 horses	Nil	11 white boys 4 natives	350	173	115	27	35	15,200	£43 15 0	4 Plots (350 acres)
WARM BATHS {	14 oxen 2 mules	Nil	1 white boy 6 natives	130	50	67	3	10	10,000	£22 10 0	1 Plot (130 acres).
PIETERSBURG {	27 oxen 4 mules	Nil	1 white boy 7 natives	190	110½	72¾	—	7	10,083	£26 3 0	2 Plots (190 acres).
GROENKLOOF {	14 oxen 2 mules	Nil	1 white boy 3 natives	66	54	9	2	—	1,000	£8 0 0	1 Plot (66 acres).
VREYBURG {	30 oxen 2 mules 4 horses	Nil	1 white boy 10 natives	200	152	42	—	6	10,000	£22 10 0	3 Plots (200 acres).

HEINRICH S. DU TOIT,

Government Dryland Agronomist.



## GOVERNMENT DRY-LAND EXPERIMENT STATION—LICHTENBURG.

## STATEMENT of Experiments on Crops harvested between 1st April, 1913, and 31st March, 1914.

Variety.	Rate of Seeding. (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
<b>POTATOES:</b>						
(1) "Scottish Triumph" .. ..	900 lbs.	November, 1913	4	March, 1914	4,000 lbs.	Four trolley loads of stable manure used per acre. Exceptional hot and dry weather prevailed during the growing period of the potato crop, and the percentage of moisture was rather low in the plots on which the "Scottish Triumph" was planted. We expected good summer rains, which never came.
(2) "Davis Cotter" .. ..	900 lbs.	November, 1913	1	March, 1914	8,250 lbs.	Four trolley loads of stable manure used.
(3) "Factor" .. ..	900 lbs.	November, 1913	1	March, 1914	8,528 lbs.	Four trolley loads of stable manure used. More moisture was conserved in the plots on which "Davis Cotter" and "Factor" were planted than in those on which "Scottish Triumph" was planted, and also the manure was in a better state of decomposition.
(4) RYE .. ..	35 lbs.	August, 1913	1½	December, 1913	1,800 lbs. (seed)	This crop was sown on a black-clay patch, and stood in places over 6 ft. high. No manure used.
<b>BARLEY:</b>						
(5) "Boer" .. ..	35 lbs.	August, 1913	1	December, 1913	1,098 lbs.	No manure.
(6) "Malting" .. ..	35 lbs.	October, 1913	1	February, 1914	900 lbs.	"
(7) "Wisconsin" .. ..	37½ lbs.	October, 1913	1	February, 1914	1,500 lbs.	"
(8) BARLEY-WHEAT .. ..	37½ lbs.	August, 1913	1	December, 1913	1,050 lbs.	No manure.
(9) BUCKWHEAT .. ..	30 lbs.	October, 1913	3	January, 1914	645 lbs.	Soil gravelly, shallow and poor. No manure.
(10) OATS (Algerian) .. ..	65 lbs.	October, 1913	2	February, 1914	1,800 lbs. oat-hay	No manure.
<b>WHEAT:</b>						
(11) "Chernouska" Durum .. ..	37½ lbs.	July, 1913	5	November, 1913	1,100 lbs.	Soya beans were grown on this land the previous year.
(12) "Federation" (soft) .. ..	37½ lbs.	April & May, '13	3	Destroyed by frost in September. Cut for forage.		
(13) "Black Don" (Durum) .. ..	37½ lbs.	July, 1913	3	November, 1913	1,115 lbs.	Soya beans were grown on this land the previous year.
(13) "Black Don" (Durum) .. ..	37½ lbs.	July, 1913	1½	November, 1913	1,045 lbs.	Sodium Nitrate 50 lbs. Superphosphate 100 lbs.
(13) "Black Don" (Durum) .. ..	37½ lbs.	November, 1913	2½	February, 1913	1,015 lbs.	Potatoes were grown the previous year on these plots. No manure was incorporated with the soil when the wheat was planted.
(14) "Victoria Red" .. ..	37½ lbs.	October, 1913	5	February, 1913	609 lbs.	Good drought and rust resister, but poor yielder.

GOVERNMENT DRY-LAND EXPERIMENT STATION—LICHTENBURG—*continued.*

STATEMENT of Experiments on Crops harvested between 1st April, 1913, to 31st March, 1914—*continued.*

Variety.	Ratio of Seeding (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
<b>MAIZE:</b>						
(15) "Hickory King"	9 lbs.	November, 1912	15	June, 1913	1,209 lbs.	No manure. Sown on moisture fallows, and well cultivated.
(16) "Reid's Yellow Dent"	9 lbs.	November, 1912	10	June, 1913	1,115 lbs.	" " " " " " " "
"Hickory King"	8½ lbs.	9th and 10th Jan., 1913	5	Damaged by frost; used as cattle feed	No moisture beds were available, hence the late plantings.	" " " " " " " "
"Hickory King"	15 lbs.	15th, 16th, 17th Jan., 1913	15	Used as green stock feed and green manure	" " " " " " " "	" " " " " " " "
(17) SOYA BEANS ..	40 lbs.	October, 1913	2	Ploughed under as green manure	This being a purely summer crop, was not planted on moisture acres, as we expected the usual summer rains which never came, hence the decrease in this year's yield. No manure.	
" ..	40 lbs.	November, 1913	5	Ploughed under as green manure		
" ..	40 lbs.	November, 1913	4	March, 1914	745 lbs.	
(18) BEANS ("Canadian Wonder")	35 lbs.	October, 1913	1	January, 1914	402 lbs.	No manure.
" ..	40 lbs.	December, 1913	1	March, 1914	600 lbs.	" "
(19) BEANS (Velvet)	35 lbs.	November, 1913	4	March, 1914	2 tons cured and baled	
(20) BEANS (Kaffir)	40 lbs.	November, 1913	5	Ploughed under as green manure		
(21) Cow PEAS ..	40 lbs.	November, 1913	5	Ploughed under as green manure		
(22) BUTTER PEAS ..	45 lbs.	December, 1913	1	March, 1914	360 lbs.	No manure.
(23) SUNFLOWER (RUSSIAN)	8 lbs.	January, 1913	5	May, 1913	450 lbs.	No manure. A portion of this crop was damaged by frost, as the flowers did not mature regularly; otherwise the yield would have been higher. About 90 lbs. of seed fill to an ordinary grain bag.
<b>MILLET:</b>						
(24) "Golden"	10 lbs.	November, 1913	3	February, 1914	1 ton (hay)	No manure.
(25) "Boer Manna"	10 lbs.	November, 1913	3	February, 1914	1½ tons (hay)	" "
(26) "Japanese"	10 lbs.	November, 1913	3	February, 1914	1¼ tons (hay)	" "

GOVERNMENT DRY-LAND EXPERIMENT STATION.—LICHTENBURG—*continued.*STATEMENT of Experiments on Crops Harvested between 1st April, 1913, and 31st March, 1914—*continued.*

Variety.	Rate of Seeding (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
(27) LINSEED (FLAX) .. .. .	5 lbs.	December, 1913	2	March, 1914	50 lbs. (seed)	The seed yield was 108 average in previous years. Germination and growth was poor. No manure used.
(28) CORIANDER .. .. .	4½ lbs.	November, 1913	1	February, 1914	15 lbs.	No manure. Growth and germination was poor.
(29) TEFF GRASS .. .. .	6 lbs.	October, 1913	20	January, 1914	1½ tons of hay	No manure. No moisture beds.
(30) "PHALARIS BULBOSA" .. .. .	Roots planted	March	Different small patches doing well			Used for green feed in winter.
(31) BEGGAR WEED (Desmodium tomentosum)	6 lbs.	November, 1913	1	February, 1914	1¼ tons	One cutting. This crop grew remarkably well last year. Is a splendid stock feed. A small portion was left for seed (50 lbs.).
(32) LUCERNE (Provence) .. .. .	15 lbs.	March, 1912	2	Three light cuttings		No manure. Soil alkaline (sodium carbonate).
(33) LUCERNE (Arabian) .. .. .	15 lbs.	March, 1914	½	Making good growth		" " " "
(34) RAFFIA .. .. .	Some roots planted	September, 1913	—	—	—	The growth is somewhat slow owing to cold climate in winter and dry, hot summer.
(35) ARTICHOKE, COTTON, GINGER, PUMPKINS, MELONS, ETC., ETC.	—	—	—	—	—	So successfully grown on small scale as to warrant growing on larger scale next year.
LUPINES .. .. .	60 lbs.	October, 1913	10	Ploughed under as green manure		
(36) FRUIT AND FOREST TREES .. .. .	—	—	—	—	—	Fruit trees, especially apples, are doing very well on dry lands. Five hundred growing. Forest trees, mostly Eucalypti, doing very well; 15,000 planted during period under review. Sometimes suffering from severe frost in winter.
RAPE, MANGEL-WURZEL, MAIZE, PEA NUTS, ETC., ETC.	—	Planted in 1913; not yet harvested	—	—	To be reported in next year's Annual Report	



## GOVERNMENT DRY-LAND EXPERIMENT STATION—GROENKLOOF.

## STATEMENT of Experiments on Crops harvested between 1st April, 1913, and 31st March, 1914.

Variety.	Rate of Seeding (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
(1) MAIZE .. .. .	10 lbs.	November, 1913	4	June, 1913	2,200 lbs.	Superphosphate 300 lbs., sodium nitrate 100 lbs. used
(2) SOYA BEANS .. .. .	40 lbs.	November, 1913	2	Ploughed under as green manure		
(3) SUGAR BEANS .. .. .	40 lbs.	January, 1913	1	March, 1913	409 lbs.	No manure.
(4) OATS (ALGERIAN) .. .. .	65 lbs.	May, 1913	2	October, 1913	2,000 lbs.	Oat hay.
(5) WHEAT (APULIA DURUM) .. .. .	37½ lbs.	May, 1913	2	—	—	Made good growth, but totally destroyed by hares.
(6) POTATOES (NORTHERN STAR) .. .. .	37½ lbs.	October, 1913	½	March, 1914	5,000 per ¼ acre	Kraal manure used.

(7) N.B.—Crops harvested after the 31/3/14 and the yields of which must appear in next year's Annual Report are: Velvet Beans, Soya Beans, Oats, Maize, Tef, Linseed, etc.

## GOVERNMENT DRY-LAND EXPERIMENT STATION.—WARM BATHS.

STATEMENT of Experiments on Crops harvested between 1st April, 1913, and 31st March, 1914.

Variety.	Rate of Seeding (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
<b>MAIZE:</b>						
(1) "Hickory King" .. ..	9 lbs.	January, 1913	20	June, 1913	1,200 lbs.	Exceptional dry, hot weather prevailed during the growing and flowering periods of the maize crop.
(2) "Yellow Kango" .. ..	10 lbs.	February, 1913	3	Cut in May for cattle feed		
(3) PEA NUTS (Virginian Mammoth) ..	25 lbs.	January, 1913	$\frac{1}{3}$	May, 1913	10 grain bags full	From $\frac{1}{4}$ of an acre.
(4) TEFF GRASS .. ..	$5\frac{1}{2}$ lbs.	January, 1913	2	April, 1913	1 ton of hay	
(5) PEARL MILLET ( <i>Pennisetum spicatum</i> )	$8\frac{1}{2}$ lbs.	January, 1913	2	—	—	Used for stock feed. Grew magnificently.
(6) VELVET BEANS .. ..	35 lbs.	January, 1913	2	May, 1913	$1\frac{1}{2}$ tons cured and baled.	
(7) SOYA BEANS .. ..	40 lbs.	January, 1913	2	May, 1913	300 lbs.	Damaged by white ants.
<b>WHEAT:</b>						
(8) "Chernouska" Durum .. ..	$37\frac{1}{2}$ lbs.	May, 1913	3	October, 1913	800 lbs.	Germination and growth was very good, but the crop was badly damaged by hares, birds and other vermin.
(9) "Federation" .. ..	$37\frac{1}{2}$ lbs.	May, 1913	1	October, 1913	823 lbs.	
(10) BARLEY ("Boer") .. ..	40 lbs.	May, 1913	2	—	—	Cut as green feed for station animals. Made excellent growth.
(11) OATS (Algerian) .. ..	65 lbs.	May, 1913	1	November, 1913	$1\frac{1}{2}$ tons of oat hay	
(12) LUCERNE (Hunter River) .. ..	15 lbs.	March, 1913	1	—	—	Three fair cuttings per season.
(13) FRUIT TREES (different varieties) ..	—	—	—	—	—	100 planted in August, 1913; growing exceptionally well.
(14) EUCALYPTUS (different varieties) ..	—	—	—	—	—	4,000 planted in March, 1913; growing exceptionally well.

(15) Crops planted in 1913-1914 which were harvested after 31/3/14 are the following:—Maize (4 varieties). Teff. Millets, Pea Nuts, Chufa Nuts, Buckwheat, Sunflowers, Soya Beans, Velvet Beans, Canadian Wonder Beans, Kafir Corn, Arrowroot, Potatoes, Summer Wheat, Pumpkins, Mangel-Wurzel, etc. These crops have done exceptionally well, notwithstanding the severe drought and intense heat.

(16) Ten thousand (10,000) Eucalyptus trees planted as wind-breaks during the period under review.

## GOVERNMENT DRY-LAND EXPERIMENT STATION.—PIETERSBURG.

## STATEMENT of Experiments on Crops planted from October, 1913, to 31st March, 1914.

[ When I was appointed Chief of the Division of Dry-Farming, I found that no experiments have been conducted on the Pietersburg Station. Mr. Visser, who was then Officer-in-Charge of the Station, explained that he devoted most of his time to fencing-in the farm and planting of trees, etc., as he had no draught animals and also because no contract was then yet arranged between the Department of Agriculture and the Pietersburg Municipality with regard to the lease of the farm. The agreement was drawn up and signed. The Government to pay one shilling per annum for 25 years. Mr. P. M. Bester was then sent from Lichtenburg to take Mr. Visser's place and to conduct experiments. Mr. Bester arrived at Pietersburg on the 1st of August, 1913. The ground was then too hard to plough, and ploughing operations were commenced in October, when the first rains came. The crops harvested and now on the lands must be recorded in the Annual Report of next year, as harvesting took place after 31st March, 1914. ]

## EXPLANATORY

	Variety.	Rate of Seeding (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
(1)	MAIZE :						
	" Hickory King "	10 lbs.	November, 1913	8	June, 1914	—	These crops have grown well, and are promising good yields. Not threshed yet.
	" Hickory King "	10 lbs.	December, 1913	16	June, 1914	—	
(2)	" Yellow Kango "	10 lbs.	December, 1913	8	June, 1914	—	
(3)	TEFF GRASS .. ..	6 lbs.	December, 1913	6	April, 1914	—	Germination and growth was good, and a heavy yield may be expected.
(4)	POTATOES (" Northern Star ") ..	900 lbs.	December, 1913	2	May, 1914	—	Grew well. Excellent yield expected.
(5)	WHEAT (" Victoria Red ") ..	37½ lbs.	December, 1913	2	April, 1914	—	Fair yield expected. Not threshed yet.



GOVERNMENT DRY-LAND EXPERIMENT STATION.—PIETERSBURG—*continued.*

## STATEMENT of Experiments on Corps planted November, 1913, to 31st March, 1914.

Variety.	Rate of Seeding. (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
(6) VELVET BEANS .. ..	35 lbs.	December, 1913	13	April, 1914	—	Grew well.
(7) YELLOW SUGAR BEANS .. ..	40 lbs.	January, 1914	5	April, 1914	—	Grew well.
(8) "HORSE TOOTH" BEANS .. ..	25 lbs.	January, 1914	5	April, 1914	—	Grew well.
(9) PEA NUTS .. ..	25 lbs.	December, 1913	$\frac{1}{2}$	April, 1914	—	Grew well.
(10) BOER MANNA (MILLET) .. ..	10 lbs.	December, 1913	2	April, 1914	—	Germination and growth very poor.
(11) LINSEED (FLAX) .. ..	5 $\frac{1}{2}$ lbs.	December, 1913	$\frac{3}{4}$	April, 1914	—	Germination and growth very poor.
(12) BUCKWHEAT .. ..	30 lbs.	January, 1914	1	April, 1914	—	Matured well, good yield expected. Not threshed yet.
(13) KAFFIR CORN (RED) .. ..	5 lbs.	January, 1914	1	May	—	Promising good yield. Not threshed yet.
(14) RYE .. ..	35 lbs.	March, 1914	1	—	—	Making good growth.
(15) OATS (ALGERIAN) .. ..	65 lbs.	March, 1914	6	—	—	Making good growth.
(16) BARLEY (BOER) .. ..	40 lbs.	March, 1914	3	—	—	Making good growth.
(17) TREES (FRUIT) .. ..	—	—	—	—	—	Eighty-three apple trees planted (83); making good growth.
(18) TREES (EUCALYPTUS) .. ..	—	—	—	—	—	Ten thousand Eucalyptus trees planted (10,000); 15,000 Eucalyptus trees now growing and healthy looking.

## GOVERNMENT DRY-LAND EXPERIMENT STATION.—VRYBURG.

## STATEMENT of Experiments on Crops harvested between 1st April, 1913, and 31st March, 1914.

EXPLANATORY.—The Vryburg Station was established some years ago by the Principal, School of Agriculture, Grootfontein, Middelburg, C.P., and remained under the control of that Institution up to October, 1913, when the Station was formally placed under the Division of Dry-Farming. Financial control was only assumed by my Division since 1st of April, 1914. This Station has done some good work in British Bechnaland, especially in the line of maize growing, grasses and other cattle feeds, as there was always a belief that Bechnaland was not a country fit for any sort of crop.

Variety Tests.		Rate of Seeding (per Eng. acre).	Time of Seeding.	No. of Acres Planted.	Time of Harvesting.	Average Yield (per Eng. acre).	Remarks.
MAIZE:							
(1)	"Cinquatini "	.. ..	10 lbs.	November, 1913	1	May, 1913	600 lbs. Small plant. Very early maturing, but not a very good yielder. No manure.
(2)	"Eureka "	.. ..	9½ lbs.	November, 1913	2	June, 1913	1,250 lbs. No manure.
(3)	"Chester County "	.. ..	10½ lbs.	November, 1913	1½	June, 1913	1,300 lbs. No manure.
(4)	"Will's Dakota "	.. ..	10½ lbs.	November, 1913	1	April, 1913	800 lbs. Very early maturing. Dwarf variety. Poor yielder.
(5)	"German Yellow "	.. ..	10 lbs.	November, 1913	2	June, 1913	1,400 lbs. No manure.
(6)	"Hickory King "	.. ..	10 lbs.	November, 1913	2	June, 1913	1,300 lbs. No manure.
(7)	"Iowa Silver Mine "	.. ..	10 lbs.	November, 1913	1	June, 1913	1,100 lbs. No manure.
(8)	"Red Cob Botan "	.. ..	10 lbs.	November, 1913	1	June, 1913	1,200 lbs. No manure.
	"Hickory King "	.. ..	15 lbs.	January, 1913	6	April, 1913	Used for ensilage.
GRASSES (EXPERIC):							
(9)	"Paspalum dl."	.. ..	10 lbs.	December	1	Stock grazing	Doing well.
(10)	"N.Z. Tall Fescue "	.. ..	30 lbs.	November	1	Stock grazing	Not doing well.
(11)	"Phalaris Bulbosa "	.. ..	3 lbs.	February	1	Stock grazing	Doing fairly well. Six varieties of indigenous grasses undergoing experimentation on a small scale.
(12)	SAINTFOIN ("Onobrychis sativa ")		12½ lbs.	February	1	Stock grazing	Doing fairly well.
(13)	SHEEPS BURNET		15 lbs.	February	1	Stock grazing	Doing very well.
(14)	SALT BUSH		—	September	½	Doing fairly well	Several varieties sown, of which "Semi-Bacota " is doing best.
LUCERNE:							
(15)	"Arabian "	.. ..	15 lbs.	March, 1912	2	Summer season	Doing best so far on dry-lands.
(16)	"Provence "	.. ..	15 lbs.	March, 1912	2	Summer season	3 cuttings

GOVERNMENT DRY-LAND EXPERIMENT STATION.—VRYBURG—*continued.*

STATEMENT of Experiments on Crops harvested between 1st April, 1913, and 31st March, 1914—*continued.*

LUCERNE:— <i>Continued</i>						
(17)	"Turkestan"	..	..	15 lbs.	March, 1912	2 Summer season 1 cutting
(18)	"Tanworth"	..	..	15 lbs.	March, 1912	2 Summer season 4 cuttings
(19)	"Peruvian"	..	..	15 lbs.	March, 1912	1 Summer season 4 cuttings
KAFFIR CORN:						
(20)	"White"	..	..	5 lbs.	November, 1913	1 April, 1913 Destroyed by vermin.
(21)	"Red"	..	..	5 lbs.	November, 1913	1 April, 1913 720 lbs. Damaged by vermin.
SORGHUM:						
(22)	"Early Amb. Cane"	..	..	5 lbs.	November, 1913	1 April, 1913 4 bags of seed
(23)	"Saccharine"	..	..	6 lbs.	November, 1913	1 April, 1913 4 bags of seed
(24)	"Planter's Friend"	..	..	5 lbs.	November, 1913	1 April, 1913 4 bags of seed
(25)	"Sugar Dwarf"	..	..	5 lbs.	November, 1913	1 Did not mature —
MILLETS:						
(26)	"Boer Mamma"	..	..	10 lbs.	January, 1914	1 Still on land at 31/3/14 Fair growth
(27)	"Japanese Barnyard"	..	..	10 lbs.	January, 1914	1 Did not germinate —
(28)	"N'Youti"	..	..	10 lbs.	January, 1914	1 Used for ensilage —
MELONS:						
(29)	"Montataan"	..	..	—	October, 1913	1 January, 1914 8 tons
(30)	"Tsama"	..	..	—	October, 1913	2 January, 1914 5 tons
(31)	"White Kaffir"	..	..	—	October, 1913	2 January, 1914 15 tons
(32)	TEFF ("Lullu") AND TOBACCO	..	..	—	—	3 — — Failed on account of bad germination, frost & vermin.
(34)	TREES (FOREST)	..	..	—	—	— — — Ten thousand planted as wind screens, etc.; doing well.
(35)	Spineless Cactus	..	..	—	—	— — — Doing fairly well. Some plants not growing well. Soil apparently too sandy.



# DRY-LAND STATION, LICHTENBURG.

## VALUATIONS.

	£	s.	d.
Buildings erected by Public Works Department (1911, '12, '13) ..	1,741	0	0
Buildings erected by Farm Labour (1913 and '14) .. ..	400	0	0
Kraal .. .. ..	25	0	0
Boreholes, P.W.D. (1910) .. .. ..	398	0	0
Windmills, 2 P.W.D. (1911 and 1913) .. .. ..	140	0	0
Tanks and Stands for Windmills, P.W.D. (1911 and 1913) ..	70	0	0
Water Troughs (2), for Cattle, P.W.D. (1911 and 1913) ..	25	0	0
Cattle Dipping Tank, P.W.D. (1913-14) .. .. ..	135	0	0
Live Stock .. .. ..	630	0	0
Implements, Machinery and Trek Gear, etc. .. .. ..	839	16	0
Fencing erected, 20 miles .. .. ..	855	0	0
Wire Netting and Fencing erected, 1,800 yds. .. .. ..	35	0	0
Fencing Material on hand .. .. ..	20	0	0
Office Furniture .. .. ..	120	8	6
	£5,434	4	6

Total area of Farm, 3,659 English Acres.

The Forest Division occupies a portion, more than half, of this Farm.

# DRY-LAND STATION, GROENKLOOF.

## VALUATIONS.

	£	s.	d.
Buildings (Farm Labour, 1912) .. .. ..	250	0	0
Live Stock .. .. ..	234	0	0
Implements .. .. ..	185	12	9
	£669	12	9

# DRY-LAND STATION, WARM-BATHS.

## VALUATIONS.

	£	s.	d.
Buildings erected (Farm Labour) .. .. ..	190	0	0
Live Stock .. .. ..	182	0	0
Equipment .. .. ..	200	2	6
Fencing Material and Fences, etc. .. .. ..	124	0	0
	£696	2	6

# DRY-LAND STATION, PIETERSBURG.

## VALUATIONS.

	£	s.	d.
Buildings erected by Public Works Department prior to Union and repairs after Union .. .. ..	1,625	0	0
Live Stock .. .. ..	300	0	0
Implements and Machinery .. .. ..	288	0	0
Fencing erected .. .. ..	288	0	0
Fencing Material on hand .. .. ..	7	0	0
Trees .. .. ..	150	0	0
	£2,658	0	0

Total area of Farm, 898 English Acres.

Total area cultivated, 190 English Acres.

H. S. du TOIT,

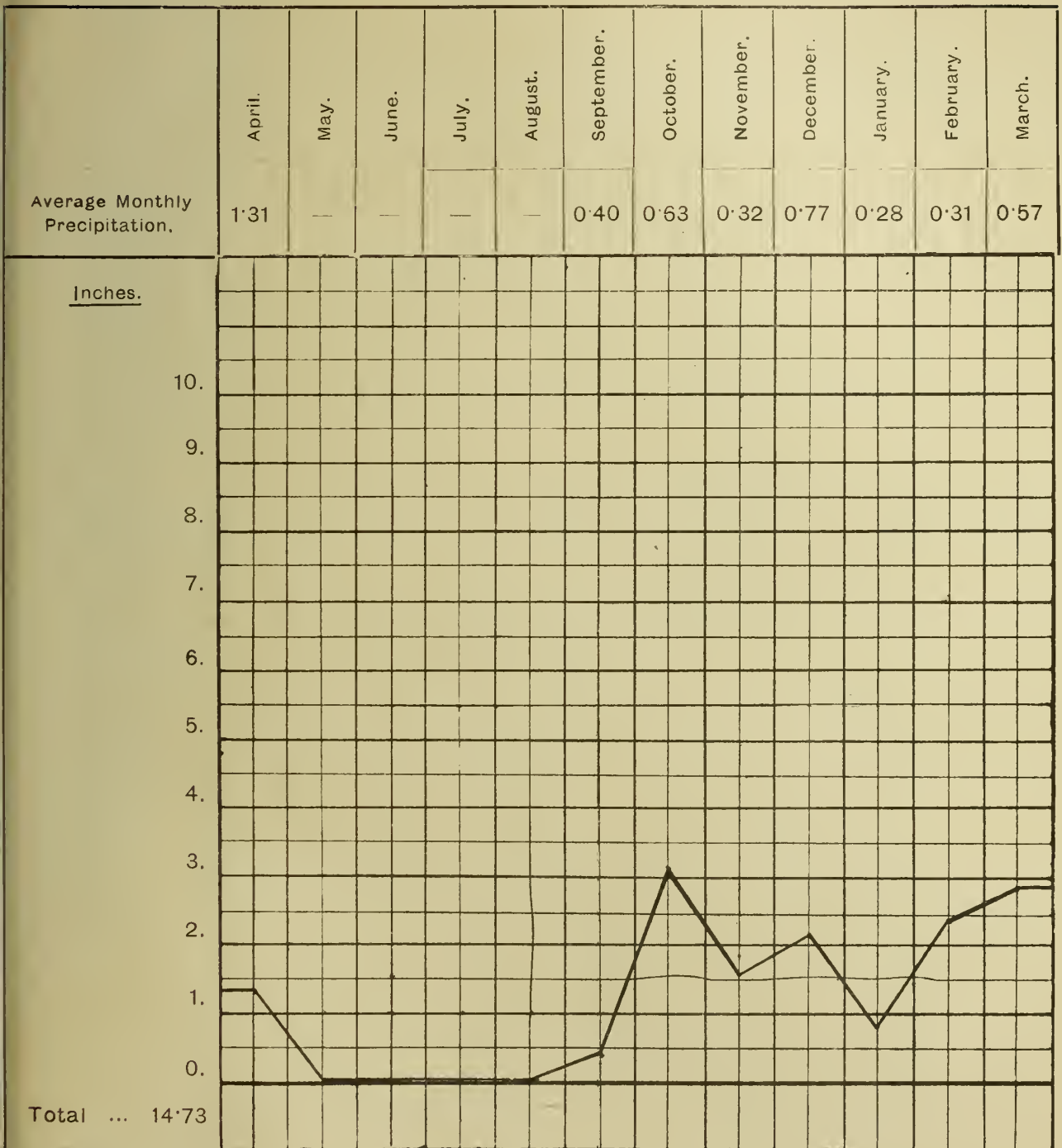
Government Dry-Land Agronomist,

STATEMENT OF Receipts and Expenditure: Division of Dry-Farming: Financial Year 1913—14.

Revenue (including Transfers).	Lichten- burg.	Groen- kloof.	Warm Baths.	Pieters- burg.	Vryburg.	Expenditure (including Transfers).	Grant.	Expenditure.	Surplus.	Deficit.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.	£ s. d.	£ s. d.
Sales of Seeds .. ..	230 4 3	—	—	—	—	Salaries and Allowances .. ..	980 0 0	932 19 2	47 9 10	—
Transfers of Seeds and Feeding Stuffs .. ..	47 0 6	—	65 11 0	—	—	Transport and Travelling .. ..	350 0 0	196 13 1	153 6 11	—
						White and Native Labour, Live Stock, Implements, Railage, General Maintenance, etc.:				
						Lichtenburg .. ..	1,150 0 0	1,415 6 9	—	265 6 9
						Groenkloof .. ..	600 0 0	467 18 6	132 1 6	—
						Warm Baths .. ..	446 0 0	479 8 6	—	33 8 6
						Pietersburg .. ..	410 0 0	513 3 8	—	103 3 8
						Vryburg .. ..	Came financially under my Division 1/4/14.			
						Grants-in-Aid .. ..	1,000 0 0	17 4 5	982 15 7	—
						Incidental Expenses .. ..	100 0 0	34 0 1	65 19 11	—
Totals .. ..	£ 277 4 9	—	65 11 0	—	—	Totals .. ..	5 035 0 0	4,056 5 2	1,381 13 9	401 18 11

# RAINFALL CURVE, LICHTENBURG DRYLAND STATION.

April 1st, 1913 to March 31st, 1914.







## APPENDIX XVII.

## GOVERNMENT GUANO ISLANDS.

ANNUAL REPORT, 1913-14.

Office of the Superintendent of the Government Guano Islands,  
Cape Town.

The Secretary for Agriculture, Pretoria.

I have the honour to submit the following Report upon the administration of the Government Guano Islands for the financial year ended the 31st March, 1914.

Following upon the lines laid down in my Report for the period 1st January, 1912, to 31st March, 1913, I have to state that the season 1913, in so far as the production of Guano is concerned, was an exceptionally good one.

The total yield from all sources was  $7,441\frac{1}{4}$  tons, or an increase of  $1,068\frac{3}{4}$  tons upon the quantity collected during the previous season.

Of this quantity, only 6,000 tons were offered for sale, nearly all of which was disposed of during 1913, the balance being kept in stock to form the nucleus of a reserve to meet future requirements.

The system in vogue, under which the Guano is being disposed of, having already been fully explained in my previous report, it will not be necessary to recapitulate the circumstances which have rendered its adoption necessary, but I may state that, since its institution the demand for Guano has grown out of all proportion, principally due no doubt to the fact that applicants, realising that there would be some difficulty in procuring their full supplies, have resorted to all manner of devices in order to obtain more than what would under ordinary circumstances be allotted to them.

In some cases orders received have been duplicated or placed through various agents, in others again, orders have been booked for various members of families, overseers, bijwoners and others; whilst in the majority of applications these have been inflated very much in excess—in some instances double and even treble—of bona fide requirements.

In support of this statement the following figures should be of interest:—

Prior to 1911, when the selling price of the Guano was reduced to £5 per ton, the average annual sale was roughly 5,850 tons, which was increased in 1911 to  $7,125\frac{1}{4}$  tons, and in 1912 to 7,862 tons.

Since the introduction of the allotment system the total quantity applied for during 1913 was  $15,531\frac{1}{4}$  tons, whilst that asked for in connection with the first allotment only of 1914 was 13,932 tons.

As the outcome of all this, it has become a very difficult matter indeed to know how to deal fairly with all applications received, and the Board, specially appointed for the purpose of allotting the Guano, was faced with a very knotty problem in deciding upon a proper distribution, in respect of the three allotments which have been dealt with during the period covered by this Report.

The principle carried out throughout the three allotments alluded to has been to give a slight preference and the most liberal treatment to the smaller applications received and to allot to the larger applicants, upon a certain scale, in accordance with the magnitude of their orders.

Of the three allotments alluded to, the first took place in March, 1913, and has already been dealt with in my Report for 1912-13.

The second allotment for the year 1913 was made in July, and the third (being the first for 1914) in February of the latter year.

With regard to the distribution made in March, 1913, only 44,550 bags (4,455 tons) of the 45,155 bags allotted were taken up and disposed of, the balance being thrown into the second (July) allotment.

In the July allotment 1,545 tons were set aside for distribution, in respect of which 1,513 applications were received for an aggregate quantity of 46,324 bags ( $4,632\frac{1}{2}$  tons).

Upon scrutinising these applications it was found that, as in the case of the previous allotment, there had been an undoubted tendency on the part of many of the applicants to ask for quantities very much in excess of their actual needs,

and further, that, in many instances, orders had been booked by grain farmers for large quantities, ostensibly for "top dressing" their crops, but doubtless with a view to providing themselves with stocks in reserve for next year's requirements.

Before proceeding with the work of allotment in this case, therefore, it was found necessary to reduce all the larger and palpably inflated orders to more reasonable limits. The total reductions effected were 6,893 bags, leaving the net quantity applied for 39,431 bags.

In all 15,450 bags of Guano were available for distribution in this allotment, the whole of which were apportioned upon the following basis:—

All applicants for 1 to 5 bags were supplied in full.
„ „ „ 6 to 10 bags were given 5 bags each.
„ „ „ 11 to 12 bags were given 6 bags each.
„ „ „ 13 to 14 bags were given 7 bags each.
„ „ „ 15 to 16 bags were given 8 bags each.
„ „ „ 17 to 25 bags were given 9 bags each.

and all applicants for 26 bags and upwards were allotted one-third of the quantity applied for.

The whole of these allotments, with the exception of 8, representing 273 bags, which were either declined or cancelled, was taken up before the end of the year.

As already stated, the next distribution was made in February, 1914, when 4,500 tons were again set aside for allotment.

In response to the Government Notice calling for applications, 2,422 were received for a total quantity of 139,320 bags (13,932 tons), or more than three times the total quantity of Guano offered for sale in this allotment.

In addition to the foregoing, many other applications were received after the list was closed, which had to be refused.

In considering these applications, save in a few glaring instances of fraud, where the application was disallowed, in face of the certificate which had been given in the case of each individual applicant (that the quantity applied for was *bona fide* required and would be used by him on his farm (stated) during the first six months of the year), the Board had no means of verifying, or otherwise, the genuineness of these statements and had, therefore, no alternative but to accept the same and proceed with the allotment in what was considered the fairest and most equitable manner possible.

This distribution was accordingly made upon the following basis, viz.:—

All applications for 10 bags, or less, were allotted in full.

Applications for 11 to 150 bags were allotted one-third of the amount applied for, subject to a minimum of 10 bags per applicant,

and those for 151 bags and upwards, one-fourth of the quantity applied for, with a minimum of 50 bags per applicant.

The total quantity of Guano apportioned in this allotment upon the foregoing scale was 45,660 bags, in respect of which 1,216 allotments, representing 21,213 bags, were taken up and paid for by the end of March, 1914.

*Delivery of Guano.*—In consequence of the whole of my reserve stock of Guano having been disposed of in 1912, and, owing to the lateness of the collecting season in 1913, the work of delivery in connection with the March allotment could not be undertaken until a sufficient supply of the new season's crop had been brought up from the islands to make a commencement with, which was not before the 16th April last year, and as the total quantity which had been received up to that date was barely enough to supply individual applicants with a third of the total quantity allotted to each, the delivery had to be effected by instalments as shipments arrived from time to time from the coast.

In view of the delay which had thus unavoidably taken place and the very large number of applications which had to be dealt with in the limited time at my disposal, matters had necessarily to be rushed to meet the very pressing requirements of the sowing season, which was just then at hand, and the best means had to be devised for carrying on and at the same time expediting the work.

Benefiting by the experience gained during the previous year in the matter of the distribution of the Guano on the instalment principle, which under the most favourable conditions was a very long and slow process, it was found desirable, in advising applicants of the quantities of Guano which had been allotted to each, to resort to the expedient of calling upon the allottees to pay for the full quantities allotted, in advance, and thus ensure that the work of delivery would not be retarded by the further delay which would inevitably have taken



place in having to communicate with these persons and wait for their replies and remittances upon each occasion that instalments were ready for despatch, before the delivery could be proceeded with.

The actual delivery of consignments was started on the 15th April, the very small allotments up to 3 bags being supplied in full and the larger ones in two and three instalments, the last of which, to complete this allotment, was not despatched until well on in July.

Although the expedient above referred to had worked very well and had simplified matters very considerably, several objections were raised to it and it was, therefore, not repeated in connection with the subsequent allotments.

With regard to the July distribution, owing to the difficulty which was experienced at the time in procuring vessels for bringing up the Guano from the coast, the delivery connected with this allotment could not be proceeded with until the 25th of that month, when ample supplies were received, which enabled me to push on this work and give all applicants the quantity apportioned to each in full, *i.e.*, in one consignment.

As, however, many of the applicants in this instance did not require their Guano until the latter part of the year, the work connected with these allotments was not completed much before the end of December.

As the result of having a reserve stock in hand at the end of 1913 and a considerable quantity of the Guano crop for 1914 being available somewhat earlier than was the case in the previous year, it was found possible to proceed with the first allotment for 1914 and the distribution in connection therewith in February and to supply all applicants with the quantities apportioned to them in full.

The actual work of delivery was commenced on the 23rd February and between that date and the 31st March, 1914, 774 consignments, representing 14,640 bags of Guano, were despatched.

*Distribution of Guano.*—As will be seen from the foregoing, the total quantity of Guano actually applied for and recorded throughout the year 1913 was 155,313 bags, or 15,531 $\frac{1}{4}$  tons, and the total quantity disposed of and delivered to various districts throughout the Union during the same period was 59,722 bags (5,972 $\frac{1}{4}$  tons), which were distributed as under:—

	Tons.	Tons.
<i>Cape Province :</i>		
Western and South Western Districts ..	5,267 $\frac{1}{4}$	
Other Districts .. .. .	211	
		5,478 $\frac{1}{4}$
<i>Transvaal</i> —All Districts .. .. .		331 $\frac{1}{2}$
<i>Natal</i> —All Districts .. .. .		132
<i>Orange Free State</i> —All Districts .. .. .		30 $\frac{1}{2}$
Total ..		5,972 $\frac{1}{4}$

*Guano Production.*—As has already been stated in this Report, the crop for 1913 was an exceptionally good one, and the prospects in so far as the crop for 1914 is concerned are very encouraging.

It is, however, impossible at the date of writing this Report to give any reliable forecast of what the new season's total output will be, as the collection has not yet been completed, but, from reports which have been received from the coast, there is every reason to anticipate that the crop for 1914 will very possibly considerably exceed that of the previous year.

At the closing date of this report, the bulk of the crops on the Colonial Islands had already been taken up and such quantities as were ready for shipment brought up to Cape Town; and on the Northern Islands the work of collection was well in hand.

The total quantity of the new season's crops received here up to the end of March was 1,556 tons.

*Season 1913.*—With regard to the season 1913, all islands, rocks, etc., upon which it was possible to collect any guano were thoroughly cleaned and all collections, with the exception of 12 tons on Bird Island and 618 tons on Ichaboe still remaining on those islands at the end of December, were brought up to Cape Town during the year.

[U.G. 2—'15.]

The following return gives the yield of guano and the quantities shipped from the various islands and rocks under my control during the year 1913, as compared with the year 1912:—

Year.	Co'lonial Group of Islands, etc.														Northern, or Ichaboe Group of Islands.													Grand Total. Tons.
	Malagas.	Dyers.	Jutten.	Bird.	Lam lerts Bay.	Dassen.	Foundlings.	Marcus.	Paternoster.	Seal Island (False Bay).	Elephant Rock.	North-West Rock.	Duiker Klip.	Total Tons.	Ichaboe.	Possession.	Penguin and Seal.	Halifax.	Mercury.	Pomona.	Sinclairs.	Plumpudding.	Hollamsbird.	Total Tons.				
Collected																												
1912 ..	1,090½	Nil	218½	203½	308½	101½	112½	75½	59½	—	40½	—	—	2,210½	2,552½	768½	253	200	165	95	78	50	—	4,162	6,372½			
1913 ..	1,018½	348½	328	271½	217½	215½	131½	88½	41½	25½	15½	1½	—	2,704	2,782	892½	260½	254½	250	115½	103	73	6½	4,737½	7,441½			
Shipped to C a p e T o w n																												
1912 ..	1,090½	—	218½	215½	278½	101½	112½	75½	59½	—	40½	—	—	2,192½	3,107½	1,064½	253	345	255	150	128	105	—	5,408½	7,601			
1913 ..	1 018½	348½	328	271½	217½	215½	131½	88½	41½	25½	15½	1½	—	2,704	2,164	892½	260½	254½	250	115½	103	73	6½	4,119½	6,823½			

In addition to the 630 tons of Guano lying on Bird and Ichaboe Islands, there was the uncollected crop on Hollamsbird Island, roughly estimated at between 300 and 400 tons. An attempt was made during the year to remove some of this Guano, but this project had to be abandoned on account of the state of the weather, after only 6½ tons had been got off the rock.

A further attempt was, however, again made in the early part of 1914 when the whole of the crop was removed, but, as no portion of this had been received by the end of March, the results of the collection would not ordinarily be accounted for in the period covered by this Report.

For reasons already explained, it would be futile attempting to draw any comparison between the demand for and sales of Guano during the years 1913 and 1914, and it would be equally difficult to form any estimate as to what the actual manurial requirements of the latter period would have been under normal conditions.

As in previous years, the Western and South-western Districts of the Cape Province absorbed the great bulk of the Guano available for disposal during 1913, but, it may be stated, the demand from other Districts and Provinces throughout the Union shows an appreciable increase in the applications for this manure and also a wider field in its distribution as compared with the sales for the previous year, as will be seen from the subjoined return showing the quantities of Guano sold from Cape Town during 1912 as compared with the quantities allotted and sold during 1913 and distributed direct to the several Districts in the Cape and other Provinces of the Union during these two years:—

Year.			Paarl.	Malmesbury.	Cape.	Stellenbosch.	Caledon.	Worcester.	Piquetberg and Clanwilliam.	Tulbagh.	Ceres.	Swellendam.	Robertson.	Laingsburg.	Oudtshoorn.	George.	Mossel Bay.	Prince Albert.	Alexandria.	East London.	Albany.	Uniondale.	Port Elizabeth.
1912	..	..	17,652	10,768	18,770½	9,320	7,578	3,403	2,407	1,703	555	344	197	53	—	29	—	6217	221	80	171	285	
1913	..	..	13,579	10,277	9,535	8,122	4,220	2,334	1,623	1,413	742	477	114	36	25	20	5	—	546	273	188	174	177

Year.	Stutterheim.	Middelburg.	Griqualand East.	Kimberley.	Humansdorp.	Cathcart.	Uitenhage.	Tembuland.	King William's Town.	Fort Beaufort.	Vryburg.	Britstown.	Alival North.	Bathurst.	Steynsburg.	Barkly West.	Prieska.	Graaff-Reinet.	Molteno.	Philipstown.	Wodehouse.	Transkei.	Komgha.	Beaufort West.	Victoria East.	Tarka.	Craddock.	Queenstown.	Transvaal.	Natal.	Orange Free State.	Total Bags.	
1912	..	35	13	27	20	33	113	194	17	6	—	20	—	—	18	4	—	—	—	—	—	—	6	—	10	10	12	1	2,754	1,009	38	78,099½	
1913	..	129	100	89	70	67	50	48	46	33	26	15	13	12	12	10	6	5	5	5	5	2	2	1	1	—	—	—	—	3,316	1,318	306	59,572

*Depots.*—The only depot which is still being continued is that at Knysna, and the following is a comparative statement showing the quantities of Guano in stock, supplied to and sold at that centre during the years 1912 and 1913, respectively:—

	1912.	1913.
Guano in stock on 1st January .. ..	44 Bags	Nil
Supplied to Depot during the year .. ..	100 „	150 Bags
Sold at Depot during the year .. ..	144 „	148 „

The total revenue realised from the sale of Guano for the year 1913, including that sold through the medium of the Knysna Depot, was £29,874 16s. 0d., in which is also included the value of 149 $\frac{3}{4}$  tons (£749) supplied as “Gratis Issues” to other Government Institutions during the year.

*Analytical Composition of Guano.*—Samples of all Guano sold throughout 1913 were submitted for analysis. In all seven determinations were made, and the average analytical composition of the stocks disposed of was as under:—

Nitrogen	...	...	...	11.63 per cent.
Potash	...	...	...	2.87 „
Phosphoric Oxide Sol. in Water	...	...	...	3.82 „
Phosphoric Oxide Sol. in Citrate	...	...	...	
Solution	...	...	...	9.12 „
Total Phosphoric Oxide	...	...	...	10.24 „
Lime	...	...	...	9.86 „

*Sale of Penguin Eggs.*—The revenue derived from the sale of Penguin Eggs during the season 1913 was £2,166 13s. 4d.

*Sealing—Winter Season* (June to August, 1913).—Sealing operations were undertaken during the winter season on Sinclairs, Long and Hollamsbird Islands of the Northern Group, as well as on Dyers Island and Elephant Rock in the Colonial Group, with very satisfactory results: the total number of seal skins obtained for the season from all sources being 5,866, of which 3,784 were contributed by the Northern and 2,082 by the Colonial Islands, respectively.

*Summer Season* (October to December, 1913).—Further sealing operations were also carried out on Elephant Rock and Quoin Rock (near Dyers Island) on the Colonial Coast during the summer months, in respect of which 481 and 63 skins, respectively, were secured.

The following is a comparative return of seal skins obtained from all sources during the years 1912 and 1913:—

Season.	Colonial Group.						Northern Group.		Grand Total. Skins.	
	Dyers Island and Quoin Rock.		Elephant Rock.		Total Skins.		Hollamsbird, Long Islands and Sinclairs Island.			
	1912.	1913.	1912.	1913.	1912.	1913.	1912.	1913.	1912.	1913.
Winter	1,213	1,502	834	580	2,047	2,082	1,512	3,784	3,559	5,866
Summer	38	63	nil	481	38	544	nil	nil	2,650	544
Totals ..	1,251	1,565	834	1,061	2,085	2,626	4,124	3,784	6,209	6,410

The total number of seal skins thus obtained during the year 1913 was 6,410. With the exception of the summer skins from Elephant Rock and Quoin Rock—in all 544—which were still on hand at the end of March, all seal skins were duly shipped to London for disposal, and put up to auction at the large sales held



towards the end of October, 1913, but, owing to the slump in the Fur Skin Market, the prices obtained for the same were very low and disappointing. Only 5,788 of these skins were actually disposed of, realising the sum of £4,730 19s. 7d., or an average of 16s. 4d. per skin the balance of 78, being the pick of the consignment, having been bought in and kept over until better prices for the same were obtainable.

This sudden collapse in the market was attributable, according to reports received from the Trades Commissioner, to the fact that there was then hardly any demand for the well-furred dressing skins, there being at the time large stocks of "dressed" skins on the market, for which there was no call, their place having been taken by substitutes such as "Musk-Squash" (an imitation closely resembling the seal skin and which is being largely used for ladies' coats), "Karakul" and "Russian Pony Coats," which were then very much in fashion and cheaper than seal skins.

Another cause which had affected the sales of furs considerably was the war in the Balkans. These States, I am informed, are large buyers of all classes of skins, and, owing to the prevailing shortage of money, the fact was at once visible in the absence of the purchase of such luxuries as furs.

In consequence of this the skins taken on the Colonial Coast during the summer season were held back here until more encouraging reports were received from London.

With regard to the skins taken during the summer season of 1912, these were all disposed of during the earlier part of the year 1913 and realised £3,252 10s. 6d., or an average of 22s. 9d. per skin.

The net revenue derived from the sale of seal skins during the year 1913 was £7,436 2s. 2d., and the average price obtained per skin was roughly 17s. 2½d.

Private sealing enterprise on the Colonial Coast was also undertaken, for which six licences were applied for and issued for the season 1913.

The total number of seal skins secured by the licensed sealers was 1,268, upon which a Royalty of £64 8s. 0d. was collected.

*Seal Oil.*—There was practically no demand for seal oil, and, notwithstanding the fact that every endeavour was made to find a market for this article, only 25 gallons were disposed of during the year.

W. R. ZEEDERBERG,

Superintendent, Government Guano Islands.

## CHIEF INSPECTOR OF GRAIN.

ANNUAL REPORT, 1913-14.

Pretoria.

The Secretary for Agriculture, Pretoria.

Sir,—I have the honour to submit my report for the year ending 31st March, 1914, on the Grading and Export of Grain.

Owing to the unfavourable season, the 1913 maize crop showed very little improvement on the previous crop, either in quantity or quality.

Owing to the experience of the last years when maize became dearer as the season advanced, growers of maize of average quality were not willing to sell their maize in July and succeeding months of last year at a price which would enable it to be exported, in fact, during the latter part of last year prices were very high locally with the prospect, if the drought continued, of rising still higher for local requirements. About the end of 1913, however, it became evident that though some parts of the two inland Provinces would produce a very small quantity of maize for the 1914 crop, other parts of the same Provinces would have a fairly good crop both in quantity and in quality.

The prospects of a fair crop for 1914 caused export to commence towards the end of the year owing to a local drop in price, and this export has been fairly maintained up to the time of writing this report. Statistics showing the export in full detail are attached herewith covering the period 1st April, 1913 to 31st March, 1914.

I might here mention that, in my opinion, events have proved it would have been much more advantageous to producers to have sold their 1913 crop earlier than in many cases they did. Prices from July to October last year showed a good profit to the farmer, which he might have availed himself of, without holding on in the hope of still higher prices and running the risk of the maize becoming weevily and "musty," and so cause it to be rejected at the Ports when sent down for export.

### REJECTED MAIZE.

On account of no maize being shipped early in the season, wet maize was practically unknown at the ports during the past year, but when the export commenced in October, large quantities of maize very much below grade were shipped as being in good condition and fit for shipment, but "below grade." I do not think it was in the interest of the good name held by South African maize that of such a small quantity exported such a large proportion should have been of such inferior quality, and it is to be hoped that in future producers and traders will be able to find a local market for the lower quality of grain.

Many consignments of weevily maize have been rejected at the ports since February last, which has caused loss to the senders, and should be a lesson for the future.

### GRADING.

No complaints have been received during the past year from up-country people or shippers as to the manner in which the graders have carried out their duties. Several complaints, however, have been received from Europe regarding the poor quality of our No. 1 Flat White Maize shipped during the season under review. This grade, as is well known, has been for the past five years considered about the best maize received in Europe, and, after careful enquiries into these complaints, I am compelled to state that I am satisfied that the maize as shipped and passed by the graders was quite equal to the No. 1 grade agreed upon at Kimberley last year by the Maize Committee. The cause of the complaints in Europe is that buyers did not fully realise that we had lowered our grades, and bought in full expectation of receiving No. 1 maize equal to that shipped during previous years. If buyers were under this impression, there may be some justi-

fication for their complaints, more especially when the fact that only one complaint had been received from Europe for the two previous years is taken into account, and this complaint was proved to have been caused by the maize being delivered to the wrong consignees, No. 2 being delivered to a consignee who should have received No. 1, and vice versa, this being due to an error in discharging at Antwerp. It is to be hoped that the Maize Conference may see its way to reverting to the original No. 1 grade, which can be grown in this country in large quantities.

#### BAGS.

Owing to the late period at which the 1913 crops were exported, it was but natural that many of the bags in which maize had been stacked up-country, "where the primitiveness of the arrangements for storage in many places is well known," should arrive at the coast in a very second-hand looking condition; it is also doubtful whether in many cases the maize had ever been put into new bags. The S.A.R. regulations are very clear on this point. There is, therefore, no excuse on the ground of ignorance of the need of new bags, and if people will persist in railing grain in bags which the graders are of opinion are not fit for shipment, they will have only themselves to blame for the extra expense they may incur through the Railway Administration enforcing the regulations which are not made to hamper the export trade but with a view to placing our maize on the oversea market in such a condition as will give the best financial results to the South African producers.

#### STATISTICS.

Full details of maize graded, rejected and shipped are shown in the appendices herewith. As will be seen, we are keeping our Australian market and with good seasons there is no reason why the competition of Australian and European buyers for our better qualities of grain should not prove very beneficial to the farmer.

#### STANDARD SAMPLES.

Type samples of the 1913 crop, as agreed upon at Kimberley by the Maize Committee, were duly made up, and, owing to South African buyers and contractors and Government Departments in many cases conducting their maize dealings on the basis of our export grades, a large number were distributed throughout the Union, and a still larger number will without doubt be circulated with each succeeding year. As hitherto samples were freely distributed by the Trades Commissioner in London to the principal grain dealers and exchanges in Europe.

#### ANNUAL MAIZE CONFERENCE.

On the 4th July, 1913, a meeting of the Annual Maize Conference, consisting of representatives of the Associated Chambers of Commerce of South Africa, the South African Agricultural Union, the Conference Shipping Lines, the Railway Administration and Co-operative Societies, and the Department of Agriculture, was held at Durban to discuss matters connected with the industry.

#### OATS.

The exportation of oats continues on a favourable basis. Of the oats exported (mostly to Mauritius) not a single complaint has been received as to the quality or grading. Should the quantity available for export increase, there is no doubt we can always find a ready sale.

#### STAFF.

Owing to the drop in the maize export, it was decided to temporarily reduce my staff. My clerk in Pretoria and the grader's clerk at Durban were transferred to the Accounting Branch of the Department, and arrangements were come to by which the grader at Durban would not draw full pay during the slack season. At Cape Town, the grader and his assistant were at slack times employed in the fruit export industry and also in giving assistance to the Guano Islands Division.



## GENERAL.

During the past year, owing to the continuance of the dry season, I have not thought it necessary to spend as much time as I should do in normal seasons travelling in the maize producing districts, but as soon as there are prospects of a good crop most of my time will again be devoted to visiting farmers and others interested in the industry.

The public are making more enquiries from this Division than formerly, and when the time comes for me to spend most of my time travelling and also visiting the ports at short intervals, it will be necessary for me again to have someone in my office to carry on during my absence.

The expenditure for the financial year 1913-14 was £2,121, and the revenue for the same period £626 Gs. 9d. It may here be pointed out that, in addition to the above, revenue collected during April and May, 1914, of maize graded and exported of the 1913 crop amounted to £510.

In conclusion I desire to tender my thanks to the officials of the Department of Railways and Harbours, and especially to the Port Managers and their staffs for their courtesy and assistance at all times to the officers of this Division.

I have the honour to be, Sir,

Your obedient servant,

G. F. NUSSEY,

Chief Inspector of Grain.



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## OSTRICH INVESTIGATIONS.

ANNUAL REPORT, 1913-14.

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During the past year the investigations have been largely concerned with problems connected with the diseases of the ostrich and its farm management generally. Throughout its first year the ostrich is peculiarly subject to diseases of various kinds, mainly parasitic in their nature, and the farmer has to be continually on the alert against them. One of the foremost objects of the investigations has been the elaboration of an ostrich tonic and disease-preventive which will help the bird over this critical stage, in place of the constant dosing, which is admittedly very troublesome and unsatisfactory. By the use of the preparation it has been found possible during several seasons to rear chicks experimentally without any dosing whatever, although on an infected area. As the investigations are now to be transferred to Grootfontein, it is hoped to test the method on the larger scale there possible, and arrange for its introduction into farming practice generally.

The experience of the ostrich and ostrich farming gained during the several years the investigations have been in progress has enabled much advance to be made in the preparation of a text-book on the ostrich, suitable for students at the Agricultural Colleges and for farmers. Chapters on the anatomy and physiology of the bird, the production and characteristics of its plumage, farm-management, breeding and chick rearing, diseases, instincts and economics are almost completed. The various articles under the general title, "Experiments with Ostriches," contributed from time to time to the *Agricultural Journal*, and now numbering twenty-two, have served as so much foundation material.

Since the end of the eighties the ostrich industry has enjoyed an almost continuous era of prosperity. As a result it has extended so widely that in 1913 the export of feathers reached the high-water mark of 1,023,307 lbs., valued at £2,953,587. The returns from it have admitted of vast developments being made in South African agriculture generally, especially in the way of fencing, irrigation, cultivation and stock improvement. Towards the end of the year 1913, the feather industry began to show the first signs of the instability which, with the beginning of the European war, has led to its complete temporary collapse. As a consequence of this much special study has been given to the economics of the ostrich situation, and numerous articles have been contributed to the various farmers' papers. In these the main contention has been that before prices can again harden a heavy reduction in the output of feathers will have to take place, for which the elimination of a large number of birds will be necessary.

It is generally admitted that the collapse of the feather industry was primarily due to the introduction of the Anti-Plumage Bill into the British House of Commons, interfering with the normal speculation in plumage of all kinds, at a time when the demand for feathers, due to fashion's changes, was less than usual. This has served to show the close relationship which exists between ostrich plumage and the so-called fancy plumage, the latter consisting of plumage mainly derived from the indiscriminate slaughter of numerous species of wild birds, against which the Anti-Plumage Bill is a protest. To meet this it is suggested that just as South Africa has built up a highly remunerative industry in domesticated ostrich plumage and thereby saved the bird from extinction, she should now build up a corresponding industry in domesticated fancy plumage. Such an industry would not only preserve many birds from possible extinction, but would give a great fillip to the wearing of plumage of all kinds, against which there could be no more objection on humane grounds than is the case with ostrich plumage. South Africa would lend itself peculiarly well to the development of such an extensive new industry, which would be supplementary and helpful to the ostrich industry, and information and data relative thereto are being collected.

J. E. DUERDEN.





## WEATHER CONDITIONS.

During the period April, 1913, to March, 1914, the weather over the Union as a whole was characterised by practically the same features as during the preceding twelve months, viz., a shortage of rainfall, unusual warmth, hot, drying winds during spring, with unseasonable late frosts in the east and centre of the Cape Province. Some of the most noteworthy occurrences were a fall of snow on the 2nd September over the south-east of the Cape, and a heavy snowstorm during the last two days of that month, which affected the northern border and north-east of the Cape, the northern and east-central Karroos and Kaffraria, also the Bethulie, Rouxville and Ficksburg districts of the Orange Free State; a severe hailstorm occurred in Pretoria on 3rd November, causing a considerable amount of damage, and a similar disastrous storm in the east of the Zoutpansberg district in December.

The mean monthly temperatures were above the average during ten months of this period, more particularly in August and January. The only two exceptional months were September and October, which were about three-fourths of a degree cooler than usual.

The mean rainfall over the Union during April was 89 per cent. of the normal; this was succeeded by a further shortage in May, which reduced the cumulative amount for the two months to 77 per cent. of the average. During the succeeding five months, June to October, the mean precipitation was more than usual, especially during September, so that the curve of cumulative rainfall rose steadily from the minimum of 77 per cent. in May to the maximum of 110 per cent. in October. The succeeding five months were months of deficient rainfall, more particularly December and January, when the precipitation was only one-half and two-thirds of the respective normals, so that the cumulative curve again fell to 89 per cent. in January, and continued at or about this ratio to the end of the period, when there was an average deficiency of 11 per cent. The rainfall during February was almost normal, being only one per cent. below the average. The cumulative rainfall was above the average in September, October and November, whilst the mean rainfall for the calendar year, January to December, 1913, was equal to the normal.

Although these are the leading features of the precipitation over the Union as a whole, an entirely different state of affairs is revealed when an examination is made of the rainfall distribution over different parts of South Africa.

Swaziland appears to have been one of the most favoured areas during this period. At the end of March, 1913, the cumulative rainfall for the first three months of the year was practically normal. Good rains fell during April, which were above the average; during May, however, the precipitation was only 8 per cent. of the normal, a shortage which reduced the total for the two months to 85 per cent. of the usual aggregate. From that period there was an alternation of wet and dry months till October, which showed an excess of more than one-third of the average. This excess was augmented by supra-normal rains in November, succeeded by almost normal rains in December. A large deficiency (51 per cent.) marked the precipitation during January, in common with the rest of the country, but this was followed by a surplus in February, whilst a shortage again in March brought the total for the twelve months to an amount only one per cent. under the average. The cumulative curve of rainfall was above the average in April, October, November, December and February, being at the minimum in May, and the primary maximum in April with a secondary maximum in November.

*Natal.*—Precipitation during the first three months of the year 1913, was almost double the average, but was succeeded by a shortage in April and May of about half the respective normals. During the following two months, June and July, rain fell at most stations in excess of the average. The mealie crops gave a fair return, but owing to the frequent frosts towards the end of May the veld was withered, and the cattle poor in consequence. During August rainfall was mostly less than half the normal, except in the north; this was succeeded by a further deficiency during September of about an inch, very material at this time of the year, so that, the veld being unsuitable for grazing, many lambs had to be slaughtered to save the ewes. Except in the north, the rains of October were

above the average, causing an improvement in the appearance of the country. Good harvests, particularly of Kaffir corn, were reaped in Zululand. During November there was again a falling off (except in the extreme north) in the amount of the rains, amounting to 71 per cent., causing the veld to dry off again, and although some good showers fell during December (saving the mealie crops in some parts) these were largely local, there being a further decrease compared with the normal. The opening month (January) of 1914 showed a deficit of over two inches or 39 per cent. of the average, but again the rains were patchy, some areas suffering from drought whilst in others both animals and plant life were in good condition. This was succeeded in February by an excess—except in the north—amounting to 50 per cent., and by a much smaller excess in March when the rains mostly hugged the spurs from the Drakensberg, causing an irregular distribution, and causing springs to recede rapidly after each freshet. The cumulative rainfall curve was at its lowest (44 per cent.) in April, after which it rose to 86 per cent. in October, falling slightly till January, but rising to 91 per cent. in March, thus showing an average deficit of 9 per cent. over Natal during the twelve months. One striking peculiarity of this curve, in which it differs from those for the other Provinces, is that in no month did it reach the normal of 100 per cent., so that the cumulative amounts of rainfall were considerably under the average all through these twelve months, although the total for the calendar year 1913 was 34 per cent. in excess of the normal.

*Transvaal.*—The excessive rains in Swaziland during April were met with in an intensified form all over the Transvaal (70 per cent. above the average), and following on a deficit of 10 per cent. since the beginning of the year, raised the cumulative amount slightly above the normal, except in the central parts of the eastern section in the south and south-west, and caused the prospects for winter to be fairly good, especially as there had been few frosts causing very little damage. During May, June and July, when the rains are usually too small to be of any importance, there was a continued shortage, and springs began to give out, except in the districts of Lydenburg and Zoutpansberg, where late rains interfered with harvesting operations. Winter set in during the latter part of May, with heavy frosts, which continued throughout June, killing the grass which had sprung up with the late rains. July, however, was exceptionally mild and fair crops were reaped, although stock was poor. The usually small rainfall of August was practically doubled in amount, except in the north, but was succeeded by a dry September, except in the Zoutpansberg, so that springs and streams which had never been known to fail became dried up and the veld very parched and bare. In some districts, the first cold rains of September killed a number of lambs. Steady soaking rains fell in excess in October, improving considerably the agricultural outlook, but causing considerable losses in stock. The hopes of a good season were, however, blasted by a continued deficiency of rain during the next three months, accompanied by high temperatures and hot winds, causing the country to become parched, springs to fail, the grass dry, and scorching seedlings, which had germinated as the result of the rains which did fall. These rains were mostly of a local nature, occurring in connection with thunderstorms, being particularly heavy, and causing floods in some places, whilst adjoining areas were suffering from drought. During February, precipitation was above the average in the east and north, but below it elsewhere, so that the crops were improved in many districts. A deficit of 22 per cent. was again experienced during March, except in the extreme north and in the Middelburg and Potchefstroom districts; consequently crops were poor and patchy, Kaffir corn having proved the best drought resister.

Although the cumulative rainfall curve continued above the normal till the end of November, this was mainly due to the exceptional rains during April, assisted by the excesses in August and October; so that except for slight rises during these months, this curve fell steadily from a maximum of 170 per cent. in April to the minimum of 88 per cent. in January. At the end of March, there was a deficit of 11 per cent. compared with the average, while the shortage during the calendar year 1913 was 7 per cent.

*Orange Free State.*—The rainfall during these twelve months over the Free State bore a strong resemblance to that over the Transvaal, the main differences being a deficit in April, 1913, and February, 1914, as against a surplus in the Transvaal and an intensification of the drought conditions. The first three months of 1913 showed a shortage of 24 per cent., which was succeeded by a continued falling-off during the next four months, so that at the end of July, the cumulative rainfall was only 53 per cent. of the normal. This constituted the minimum for the twelve months, and the curve rose to 70 per cent. in August owing to the surplus



amounts recorded during that month. Although there was again a diminution in September, the excessive rains of October were sufficient to raise the cumulative curve at the end of that month to the normal (100 per cent.). Any hopes of a good agricultural season that may have been raised in consequence of these rains were falsified by continued large deficits during each of the succeeding five months, so that at the end of March the total rainfall for the whole period was only 66 per cent. or two-thirds of the normal. Notwithstanding the serious drought, some fair crops were harvested in the north and east of the Free State. At the end of the year, hot, dry winds prevailed to such an extent as to cause trees to dry, fruit to shrivel up, and the veld to wear such a wintry appearance that even the grass was stated to be dead, whilst dams were empty and springs drying up. The rains of the subsequent months did little to mitigate this terrible state of affairs, and owing to the absence of grass and water, cattle had to be sent where there was better winter grazing.

*Cape Province.*—The total rainfall for the first three months of 1913 showed an excess of 18 per cent. above the normal. During April the precipitation was slightly in excess over the more easterly portions of Bechuanaland, the northern border and northern Karroo, and the Cape Peninsula, but elsewhere there was a deficiency averaging 38 per cent. of the normal. This was succeeded by a similar shortage in May, common to the whole country with the exception of portions of Kaffraria and the south-east. Good rains fell in excess over the western half of the colony during June, averaging 22 per cent., whilst deficient precipitation was experienced over the eastern portion and the extreme south-west, with absolute drought in Bechuanaland. These were succeeded by further good rains, mostly in excess, over the west and south during July and August, and although there was a deficiency elsewhere, the mean rainfall for both months was in excess of the normals, so that the cumulative amounts had increased from 62 per cent. in April and May to 88 per cent. in August. Exceptionally abundant soaking rains (with a heavy snowstorm on the last two days of the month over a large portion of the north and east) fell over practically the whole country, raising the cumulative rainfall to 8 per cent. above the average.

Although floods and losses in lambs and poor stock occurred in some parts, these losses were more than counterbalanced by the benefits accruing in others from the breaking up of the drought, more particularly in the east and centre, many farmers being saved from ruin. During October, rainfall was in excess, except over the eastern portions, Kaffraria and the southern Karroo, the surplus over the one area just counterbalancing the deficit over the other, so that the mean monthly rainfall was equal to the normal. In Bechuanaland the rains were succeeded by hot, droughty days, so that the grass was wilted and the crops succumbed. The normal rainfall of October was succeeded by deficient fall in November over the greater part of the country, averaging only 75 per cent. of the normal: excessive quantities were limited to the winter rainfall area and parts of Bechuanaland, northern border and northern Karroo. Cold winds and late frosts caused some damage to crops and pasturage in the north-east. The month of December, usually one of the wettest over the summer rainfall area, was relatively the driest of the period under consideration—the northern Karroo, and even some places in the south-east, suffering from absolute drought whilst the average rainfall was only 25 per cent. of the usual amount. Hot, drying winds and high temperatures prevailed during the day, while the nights were cool with occasional frost, the veld being brown and parched, and crops partially destroyed and springs failing in places in consequence. In January there was an excess of precipitation over the west coast, the south-west, the south coast, southern Karroo, south-east and the coastal areas of Kaffraria, but a general shortage over the interior, amounting to absolute drought in parts of the Graaff-Reinet District. Good soaking rains fell in excess during February over Bechuanaland, the eastern districts, Kaffraria, south coast, and southern Karroo, benefiting the veld and crops considerably, but deficient rainfall occurred elsewhere, drought conditions prevailing over the greater part of the northern Karroo. The shortage this month averaged 12 per cent. Precipitation was fairly satisfactory during March over the summer rainfall area, although an excess was confined mainly to the northern Karroo, the north-east, parts of the south-east of Bechuanaland; the mean deficiency for the month was 18 per cent., causing a mean shortage of about 2 inches or 10 per cent. over the whole of the Cape Province at the end of the twelve months.

To sum up, it may be stated that a state of drought prevailed over the western part of the Transvaal, Bechuanaland, the Orange Free State, the more easterly portions of the Cape Colony, and the Transkei. It was most severe and

disastrous in the Free State where the mean rainfall for the twelve months was only two-thirds of the normal; over Swaziland the total rainfall was about equal to the average, but in the other Provinces of the Union there was a shortage amounting to approximately 10 per cent. Over the Transvaal there were only four months of the year in which the rainfall was more than the average, and had it not been for the exceptional rains in April, assisted by those of August and October, the deficit would have been much larger. In fact, right up to the end of November, the total was considerably above the normal, but the deficient precipitation of the next three months, together with that of March caused the total fall at the end of twelve months to be on an average, three inches or 11 per cent. less than the normal.

The Orange Free State was exceptionally unfortunate in that, following on the drought of the preceding period, there was, with the exception of August, a succession of months with sub-normal rainfall up to the end of September. In fact, had it not been for the exceptional rains during October, the cumulative rainfall curve would not have even approximated to the normals at any time during the year. During the succeeding five months there was again a period of exceptionally severe drought, the actual mean deficit from the normals amounting to 8.66 inches or 34 per cent. The effects of the drought were intensified by strong, hot, drying winds and high temperatures, particularly during November and December.

A similar state of affairs prevailed over Bechuanaland.

The conditions in Natal were peculiar, as already noted, in that at no time did the cumulative rainfall curve reach the normal. In fact, this curve was practically the inverse of the corresponding curve of the Transvaal, in that it was steadily rising whilst that for the Transvaal was steadily falling throughout this period. There were five months in which the mean rainfall was above the average, June, July, October, February and March. During the first two of these months it resembled that of the Cape; during October the excess was practically common to the whole of the Union; in February an excess also occurred in Swaziland and the Transvaal, but during March Natal alone showed a surplus of precipitation.

Over the Cape Province the winter-spring months of June to September constituted the period of excessive rainfall, whilst the other months showed large deficits. It is not, therefore, surprising that the winter rainfall area showed a surplus of precipitation, whilst deficient rainfall occurred over the greater part of the summer rainfall area. The cumulative curve was at its minimum of 62 per cent. in April and May, and reached its maximum 108 per cent. in September, after which it fell to 90 per cent. in March; there was thus an average shortage of 10 per cent. over the Cape Province. Although certain stations in the east and centre showed a plus rainfall for the period, this was mainly due to the heavy rains of September and the normal rains of October.

It will thus be seen that, except perhaps over the Free State, the mere shortage in amount was not sufficient in itself to account for the disastrous effects of this drought; the main factor would appear to have been its distribution in time, by which good rains in one month were succeeded by three, four or even five months of sub-normal precipitation, accompanied by high temperatures and hot, strong, drying winds.

In the accompanying tables A and B, there are given a number of stations, distributed over the summer rainfall area, from which it will be seen that, at least as far as actual quantity is concerned, the 1913-14 drought was more intense over the western Transvaal, the Orange Free State, Bechuanaland, the north-east of the Cape Province and Kaffraria, chiefly owing to the large deficits during the last four or five months of this period, but less severe over the other parts of the country than during 1912-13.

TABLE A.

Station.	Rainfall, 1st January to 30th June.				Rainfall, 1st July to 30th November.			
	1913.	1912.	1897.	Normal.	1913.	1912.	1897.	Normal.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Komatipoort .. ..	14·96	10·33	—	17·10	7·45	·94	—	6·02
Louis Trichardt ..	18·16	16·44	—	17·96	6·72	1·74	—	6·52
Johannesburg .. ..	12·50	14·26	19·73	17·25	10·11	2·57	5·77	7·25
Zeerust .. ..	14·07	10·86	—	15·54	5·08	1·17	—	5·34
Pretoria .. ..	17·69	13·13	—	17·29	7·36	4·83	—	7·93
Mbabane .. ..	28·07	22·93	—	28·04	16·07	7·12	—	13·11
Bloemfontein .. ..	11·13	9·79	11·26	14·51	3·84	1·76	3·53	5·49
Durban .. ..	41·95	15·09	16·40	19·48	13·66	5·75	13·40	15·82
Vryburg .. ..	12·12	14·04	9·21	19·28	4·18	·79	·58	3·06
Pella .. ..	3·43	·80	2·60	3·86	·16	nil	nil	1·92
Hopetown .. ..	8·73	8·82	8·83	9·40	6·58	·09	·11	2·74
Murraysburg .. ..	9·11	4·34	6·16	7·85	4·10	·21	1·11	2·81
Aliwal North .. ..	10·24	12·51	10·94	15·81	5·25	1·22	1·59	6·16
Queenstown .. ..	14·71	11·25	4·77	14·60	9·85	1·62	·90	6·65
Kokstad .. ..	19·11	15·41	17·80	14·84	9·53	2·89	2·29	7·90
Umtata .. ..	14·61	9·93	17·54	14·24	8·69	2·35	3·08	10·04

TABLE B.

Station.	Rainfall April, 1913, to March, 1914.	Normal.	Departure from Normal.	Percentage departure from Normal.	Rainfall, April, 1912, to March, 1913.
Komatipoort .. ..	22·26	25·57	— 3·31	—13	17·98
Louis Trichardt .. ..	27·37	29·02	— 1·65	— 6	21·43
Johannesburg .. ..	24·44	28·39	— 3·95	—14	21·20
Zeerust .. ..	15·82	23·74	— 7·92	—33	20·62
Pretoria .. ..	23·73	28·58	— 4·85	—17	25·90
Mbabane .. ..	47·82	48·75	— ·93	— 2	42·17
Bloemfontein .. ..	12·24	22·69	—10·45	—46	16·94
Durban .. ..	42·05	39·80	+ 2·25	— 6	63·99
Vryburg .. ..	13·10	25·50	—12·40	—49	16·76
Pella .. ..	3·12	3·31	— ·19	— 6	2·15
Hopetown .. ..	12·51	13·62	— 1·11	— 8	10·03
Murraysburg .. ..	9·38	11·69	— 2·31	—20	7·65
Aliwal North .. ..	12·52	25·26	—12·74	—50	18·33
Queenstown .. ..	22·90	24·53	— 1·63	— 7	21·90
Kokstad .. ..	21·65	27·09	— 5·44	—20	31·16
Umtata .. ..	21·80	25·46	— 3·66	—14	24·64





## APPENDIX XXI.

## ORGANIZATION OF DEPARTMENT OF AGRICULTURE.

Administrative Office: Union Buildings, Pretoria.

Secretary for Agriculture: F. B. Smith.

Under-Secretaries for Agriculture: Vote VI.—P. J. du Toit; Vote VII.—A. Holm.

Deputy Accounting Officer: J. Collie.

Chief Clerk: G. N. Williams.

Officer in Charge of Inquiry Office, Cape Town: G. W. Klerck, Department of Agriculture.

Officer in Charge of Inquiry Office, Bloemfontein: G. F. Joubert, Department of Agriculture.

### VETERINARY DIVISION.

This Division endeavours to prevent the introduction of contagious diseases of live stock into the Union and to eradicate such as are already present, and to protect live stock against enzootic diseases by inoculation and other means. So far as it is able to do so without interfering with its other duties, the Division advises and assists farmers upon diseases of stock generally and endeavours to enlighten them upon veterinary hygiene and the care of live stock. For veterinary purposes the Union is divided into five areas, each in charge of Senior Veterinary Surgeons, who are responsible for the control of disease within these areas.

Principal Veterinary Surgeon: C. E. Gray. Assistant Principal Veterinary Surgeon: J. D. Borthwick.

*Cape Province.*—Senior Veterinary Surgeon: R. W. Dixon, Department of Agriculture, Cape Town. Government Veterinary Surgeons: A. Goodall, W. Jowett and E. Fern, Cape Town; R. P. Jones, East London; J. H. L. Lyons, Graaff-Reinet; W. P. Hamlyn, Komgha; A. Mathew, Elliot; W. A. Simson, Cradock; W. Jones, Uitenhage; J. Nicol, Kingwilliamstown; W. G. Pakeman, Queenstown; T. M. Dale, Mossel Bay.

*Transvaal.*—Senior Veterinary Surgeon: J. M. Christy. Government Veterinary Surgeons: R. S. Garraway, Pretoria; W. G. Evans, Volksrust; P. Conacher, Johannesburg; J. I. Edgar, Pietersburg; G. May, Rustenburg; H. M. Webb, Piet Retief; G. C. Webster, Barberton; J. M. Tate, Potchefstroom; J. G. Bush, Krugersdorp; G. Lee, Middelburg; F. Dunning, Lydenburg; G. McCall, Nylstroom.

*Natal.*—Senior Veterinary Surgeon: W. M. Power (G. W. Freer, Acting), Pietermaritzburg. Government Veterinary Surgeons: S. H. Ewing, Eshowe; A. F. Harber, Durban; S. I. Johnston, Mooi River; F. J. Hill, Ladysmith; A. Goule, Maritzburg; J. L. Webb, Bulwer; C. Tyler, Port Shepstone; and F. Hutchinson, Dundee.

*Orange Free State.*—Senior Veterinary Surgeon: A. Grist, Bloemfontein. Government Veterinary Surgeons: J. F. Joyce, Ficksburg; J. R. R. Hamilton, Bloemfontein; F. M. Skues, Bethlehem; C. H. Wadlow, Smithfield; and C. T. Clemow, Frankfort.

*Transkeian Territories.*—Senior Veterinary Surgeon: J. Spreull, Umtata. Government Veterinary Surgeons: A. M. Howie, A. C. Kirkpatrick, R. Paine, W. A. Dykins, J. J. G. Keppel and J. A. Worsley, Umtata.

### DIVISION OF VETERINARY RESEARCH.

Offices and Laboratories: Onderstepoort, Pretoria.

The duty of this Division is the investigation of diseases of live stock with a view to discovering methods of suppressing them or of protecting animals against them. It examines and reports upon pathological specimens forwarded by the Veterinary Division and farmers, and prepares and supplies vaccines, sera, and other diagnostic or preventive agents.

Opportunities are offered to post-graduate students for the carrying out of special investigations.

The Division is in close touch with and is complementary to the Veterinary Division. Director of Veterinary Research: Sir Arnold Theiler, K.C.M.G. Assistant Director of Veterinary Research: W. Robertson, Grahamstown. Veterin-

ary Research Officers: W. H. Andrews, D. Kehoe, Dr. F. Veglia, J. Walker, E. M. Robinson, G. de Kock, P. R. Viljoen, Pretoria; and D. T. Mitchell, in charge of the Laboratory at Pietermaritzburg. Biological Chemist: H. H. Green. Entomologist: G. A. H. Bedford. Superintendent: E. B. H. Parkes.

Lamziekte Research Station: Christiana. Officer in Charge: W. H. Andrews; and Armoed's Vlake.—Officer in Charge: R. R. Sharpe.

#### DIVISION OF SHEEP AND WOOL.

This Division is charged with: (a) Eradication of scab; (b) promotion of sheep and goat industries, by advising upon the grading and management of sheep and goats and the preparation and marketing of wool and mohair; (c) the management of the Stud Sheep Farm at Ermelo; (d) the improvement of the flocks maintained on the various experimental farms. Students are taken at the Ermelo Farm.

Chief of Division: B. G. L. Enslin. Principal Sheep Inspector: W. L. Currie, C.M.G.

For the better carrying out of the work in connection with scab, the Union is divided into twenty-five areas in charge of Senior Sheep Inspectors; these areas are in turn divided into 322 inspection districts, each in charge of an Inspector. In addition there are ten Inspectors employed on the railway lines for the prevention of the movement of infected stock by rail. There are also five whole-time Inspectors employed on certain large commonages.

A similar organisation is adopted in respect of the improvement of sheep and wool.

*Northern Division.*—Senior Sheep and Wool Expert: Charles Mallinson, Pretoria. Sheep and Wool Experts: A. M. Spies, Bloemfontein; E. V. Roberts, Bethlehem; G. J. Schuurmann, Christiana; R. B. Pickles, Ermelo; J. J. McCall, Pietersburg.

*Southern Division.*—Senior Sheep and Wool Expert: J. F. McNab, Bloemfontein. Sheep and Wool Experts: W. M. McKee, Queenstown; E. V. Goddefroy, Worcester; P. S. Taylor, Steynsburg; A. V. M. Suter, Bloemfontein.

#### DIVISION OF ENTOMOLOGY.

This Division deals with all matters relating to insects. It is charged with the administration of the regulations relative to the introduction of plants, bees-wax and foundation comb, to the inspection and quarantine of plant nurseries, and to restrictions on the removal of plants (inclusive of fruits) from place to place within the Union. A field station for the study of wattle insects is maintained at New Hanover, Natal.

Chief of Division: C. P. Lounsbury. Assistant Chief: Claude Fuller. Entomologist: David Gunn. Senior Nursery Inspector: A. E. Kelly. Entomological Assistants: F. Thomsen and J. W. Hodgson, Pretoria.

*Cape Town.*—Entomologist in Charge: C. W. Mally. Entomologist: C. P. van der Merwe. Entomological Assistant: S. M. Wood.

*Bloemfontein.*—Entomologist in Charge: J. C. Faure.

*New Hanover, Natal.*—Entomologist: C. B. Hardenberg (wattle insects only). Entomological Assistant: G. C. Haines.

The Collector of Customs at Mossel Bay is Plant Inspector for that port, and the Collector of Customs at Lourenco Marques applies the respective regulations at Delagoa Bay.

Plant Inspectors are stationed at the Docks at Cape Town, Durban and Port Elizabeth, and at Johannesburg.

#### DIVISION OF BOTANY AND PLANT PATHOLOGY.

This Division is engaged in the investigation and control of diseases of plants produced by fungous and physiological causes, and the study and collection of fungi of economic importance. The Division is also concerned with the investigation of the merits of indigenous plants of economic importance and of poisonous plants and noxious weeds, the identification of plants, the introduction and testing of economic plants from abroad and the improvement of farm crops by breeding.

Chief of Division: I. B. Pole Evans. Director, Natal Herbarium: J. Medley Wood. Assistant Botanist: A. O. D. Mogg. Professional Assistants: Miss E. M. Doidge, P. A. van der Bijl, Miss A. Bottomley and Miss M. Franks. Herbarium Assistant: Miss S. M. Stent.



## DIVISION OF TOBACCO AND COTTON.

The object of this Division is the promotion of the tobacco and cotton industries. Experiments are conducted in the breeding and growth of tobacco and cotton and in the curing, fermentation and preparation of tobacco for the market. Approved varieties of tobacco and cotton seed are distributed amongst farmers, and advice given to them personally and by correspondence and publications. Students are taken at the Rustenburg Station.

Chief of Division: W. H. Scherffius. Assistant Chief and Manager, Experimental Station, Rustenburg: H. W. Taylor. Tobacco Warehouse Expert: T. E. Elgin. Expert for Turkish tobacco, Western Province, Cape: L. M. Stella, Stellenbosch. Manager, Experimental Station, Barberton: (vacant). Manager, Tzaneen Estate: E. H. T. Powell. Manager, Experimental Station, Piet Retief: R. T. Falgate. Tobacco and Cotton Experts: Natal: W. B. Wilson, Durban; Orange Free State: J. du P. Oosthuizen, Vredefort; Eastern Province: P. Koch, East London.

## DIVISION OF DAIRYING.

This Division deals with all matters connected with the advancement of dairying. Superintendent of Dairying: E. O. Challis. Senior Inspector: E. G. Hardy. Inspector for Cape Province: J. P. Gow, Department of Agriculture, Cape Town. Instructors: *Cape Province*: C. Schmolke, Queenstown; *Orange Free State*: L. J. Veenstra, Bloemfontein; *Natal*: — — —, Pietermaritzburg; *Transvaal*: W. Oosterlaak, Pretoria.

## DIVISION OF HORTICULTURE.

This Division advises farmers on the growing and marketing and export of fruit.

Chief of Division: R. A. Davis. Horticulturist in charge of Experimental Station, Warmbaths: C. A. Simmonds. Itinerant Instructor in Horticulture for the eastern portion of the Cape Province: R. le Sueur, Grahamstown. Government Fruit Inspector, Cape Town: R. J. Bulmer.

## DIVISION OF VITICULTURE.

Headquarters: School of Agriculture, Elsenburg, Mulder's Vlei, Cape Province.

This Division is charged with the duty of advising farmers in all matters relating to the culture of the vine and the manufacture of wine and brandy and vinegar. It conducts field investigations into the suitability of various stocks, the use of fertilisers, modes of cultivation, etc., and investigates the diseases of the vine, and conducts both cellar and laboratory experiments in the making of wine and brandy. It examines pathological specimens and furnishes reports thereon, and examines chemically and bacteriologically specimens of the products above mentioned with a view to furnishing advice thereon to farmers.

This Division also includes the Government Wine Farm, Groot Constantia, where advice can be obtained by residents in the Wynberg and Hout Bay areas.

Government Viticulturist: A. I. Perold, Elsenburg, Mulder's Vlei, Cape Province. Manager, Viticultural Experiment Station, Paarl, Cape Province: A. Wagener. Manager, Government Wine Farm, Groot Constantia: T. L. Watermeyer.

## OFFICE OF GUANO ISLANDS.

This Office undertakes the conservation, collection, shipment and sale to the public of the guano, seal skins, etc., obtained on the various islands belonging to the Union, and is charged with the administration of all matters connected therewith.

Superintendent: W. R. R. Zeederberg.

## DIVISION OF CO-OPERATION.

This Division is engaged in promoting co-operation for the sale and purchase of agricultural products and necessities amongst farmers, and in organizing and supervising co-operative societies.

Registrar: C. H. Keet. Acting Registrar: A. E. Marks. Inspectors: J. Retief and H. Minnaar.

## DIVISION OF CHEMISTRY.

This Division investigates problems of general or special importance, and for the present undertakes the analysis of soils, manures and foodstuffs for farmers

in the Transvaal, the analysis of similar matters in the other Provinces being undertaken in the laboratories of the Department of the Interior at Cape Town, Grahamstown, Cedara and Bloemfontein, pending the enlargement of the chemical laboratories at the agricultural schools and experiment stations.

The analyses are conducted solely for the enlightenment of the farmers and not for legal purposes.

Chemist: H. J. Vipond. Assistant Chemists: Dr. B. de C. Marchand and B. J. Smit. Laboratory Assistant: L. Bischoff.

#### DIVISION OF FENCING AND BRANDS.

This Division administers the laws relating to fencing and brands, and publishes the Brands Directory, required by the Transvaal Brands Act.

Controller of Fencing and Registrar of Brands: W. J. Nussey.

#### OFFICE OF HOUSEHOLD SCIENCE.

The duties of this Office are to promote the study of household science by means of lectures, demonstrations and correspondence.

Lecturer and Instructor: Miss J. C. van Duyn.

#### DIVISION OF DRY-LAND FARMING

Offices: Lichtenburg.

This Division conducts experiments and disseminates information on dry-land farming. An experiment station is maintained at Lichtenburg, with subsidiary ones at Pretoria, Warmbaths and Pietersburg. Experiments in dry-farming are also conducted at the agricultural schools and experiment stations and at other centres.

Dry-land Agronomist and Manager, Experiment Station, Lichtenburg: H. S. du Toit.

#### DIVISION OF GRAIN INSPECTION.

This Division undertakes the grading of grain at the ports prior to export, and, if requested to do so, determines the amount of moisture present in grain intended for export.

Chief Inspector of Grain: G. F. Nussey. Government graders are stationed at the Docks at Cape Town, Port Elizabeth, East London and Durban.

#### DIVISION OF PUBLICATIONS.

This Division edits the "Agricultural Journal" and other departmental publications.

Acting Editor: H. J. Choles.

#### LIBRARY.

The object of the Library is to provide as complete a collection of agricultural literature as possible for the purpose of reference. The Library is open to the public during official hours, and books may be borrowed on certain conditions.

Librarian: P. Ribbink.

#### AGRICULTURAL SCHOOLS AND EXPERIMENT STATIONS.

The duties of these Institutions are to provide complete courses of education extending over a period of two years, and shorter courses of a technical character for persons actually engaged in farming; to instruct farmers in the area served by them on matters relating to the various phases of farming by means of personal visits, lectures, demonstrations and correspondence; to conduct experiments, to analyse soils, manures, dairy products, etc., and to identify plants and insects and test seeds. A certain amount of pure-bred stock and of new and approved varieties of seeds are produced on the farms and disposed of to the public.

The Institutions do not undertake the administration of laws relating to agriculture. They are situated at Elsenburg and Middelburg, C.P., Potchefstroom, Cedara and Glen.

#### STUD FARMS.

At these farms pure-bred animals, mainly horses, are maintained and bred for lease and sale to farmers.

*Standerton Stud Farm.*—Station: Standerton. Distance, 11 miles. General Manager: A. McMac.

*Tweespruit Stud Farm.*—Station: Tweespruit, on farm. Manager: J. J. Morton.

## APPENDIX XXII.

PURE BRED LIVE STOCK IMPORTED INTO THE UNION DURING  
THE YEAR ENDED 31ST MARCH, 1914.

## HORSES AND ASSES.

	Stallions.	Colts.	Mares.	Fillies.	Asses.
Thoroughbred ..	29	2	21	1	19
Hackney .. ..	15	—	3	—	—
Clydesdale .. ..	12	—	14	—	—
Sundry .. ..	24	2	11	7	—
	80	4	49	8	19

## CATTLE.

	Bulls.	Cows, Heifers.	Calves.
Shorthorn .. ..	117	226	7
Devon .. ..	31	38	—
South Devon .. ..	61	92	5
Ayrshire .. ..	21	83	—
Aberdeen Angus .. ..	12	12	—
Hereford .. ..	12	7	—
Red Polled .. ..	10	21	2
Friesland .. ..	55	178	11
Sundry .. ..	27	118	3
	346	775	28

## SHEEP.

	Rams.	Ewes.
Merinos .. ..	81	214
Shropshire .. ..	7	53
Sundry .. ..	42	73
	130	340

## PIGS.

	Boars.	Sows.
Large Black .. ..	2	3
Large White .. ..	1	2
Berkshire .. ..	7	15
Tamworth .. ..	5	8
Sundry .. ..	1	2
	16	30

## COUNTRIES OF ORIGIN.

	British Isles.	Holland.	Australia.	Spain.	Elsewhere.	Total.
Horses .. ..	135	2	1	—	3	141
Asses .. ..	1	—	—	18	—	19
Cattle .. ..	790	318	24	—	17	149
Sheep .. ..	158	—	293	—	19	470
Pigs .. ..	46	—	—	—	—	46



## APPENDIX XXIII.

Return showing Value of Importations from Oversea of certain Agricultural Produce and Articles used for Agricultural purposes during the years 1912 and 1913.

Produce or Article.	1912.		1913.	
	Imported.	Consumed.	Imported.	Consumed.
	£	£	£	£
Beans and Peas .. .. .	41,520	41,153	71,613	66,861
Dholl .. .. .	19,314	18,292	24,492	23,547
Flour, Wheaten and Wheaten Meal	498,464	496,539	742,781	716,662
Maize .. .. .	3,885	67	91,455	82,162
Malt .. .. .	95,434	95,731	87,405	87,446
Oats .. .. .	3,663	3,221	2,540	3,306
Wheat .. .. .	395,265	396,760	1,060,346	941,776
Oatmeal .. .. .	58,124	55,802	53,888	53,346
Fruit, Fresh (including Nuts) ..	90,899	87,526	97,843	92,140
Fruit, Dried or Preserved, and Dates .. .. .	59,964	57,776	76,575	73,195
Rice .. .. .	389,815	384,125	443,033	424,060
Sugar and Sugar Products ..	409,835	409,119	492,905	493,962
Butter and Butter substitutes ..	318,530	286,385	255,622	246,588
Cheese .. .. .	158,787	153,372	167,440	152,076
Milk, Condensed .. .. .	424,460	424,269	464,888	449,653
Eggs, Fresh .. .. .	69,753	66,594	77,560	74,909
Hams, Bacon and Salted Meats ..	225,775	216,768	268,112	254,263
Lard .. .. .	43,642	42,511	74,037	69,523
Beef .. .. .	88,270	58,271	80,516	46,361
Mutton .. .. .	25,450	15,279	24,448	17,835
Poultry .. .. .	8,757	7,054	8,610	7,494
Potatoes .. .. .	39,330	35,972	52,631	48,027
Game .. .. .	919	1,003	1,517	1,455
Meats, Tinned and Preserved ..	125,818	115,770	143,050	135,888
Biscuits and Cakes .. .. .	71,645	67,528	68,679	65,792
Confectionery, Jams and Jellies ..	288,127	283,286	326,143	319,380
Fish, Fresh, Dried and Preserved	271,651	255,277	283,626	271,611
Pickles, Sauces and Condiments (including Spices and Tur- meric) .. .. .	93,968	89,062	92,238	90,149
Hops .. .. .	40,785	41,206	26,450	26,188
*Tobacco (Unmanufactured) ..	39,574	41,538	50,358	44,222
Tobacco (Cigars, Cigarettes and other Manufactures) .. .. .	136,666	125,238	140,547	128,669
Brandy .. .. .	69,710	61,985	61,968	60,224
Wines .. .. .	73,001	63,053	69,873	60,452
	4,670,800	4,497,532	5,983,189	5,639,222
*Imported from Rhodesia ..	28,728	—	49,995	—

## APPENDIX XXIII.—(Continued).

Return showing Value of Imports from Oversea of certain Articles used for Agricultural purposes during the years 1912 and 1913.

Produce or Article.	1912.		1913.	
	Imported.	Consumed.	Imported.	Consumed.
	£	£	£	£
Agricultural Machinery .. ..	221,092	219,853	209,212	204,712
Agricultural Implements .. .	448,794	434,365	406,672	391,574
Manures and Fertilisers .. .	124,511	124,107	188,431	186,849
Seeds .. .. .	41,481	40,235	40,450	39,259
Sheep Dip .. .. .	90,803	87,756	107,872	105,404
Water-boring Machinery .. .	23,815	19,131	37,353	31,666
Fencing Material. Wire Standards. etc. .. .. .	457,374	458,249	593,542	590,973
Binding Twine and Harvest Yarn	18,179	18,099	19,103	18,853
Cement .. .. .	114,921	103,892	125,616	117,681
Saddlery and Harness .. .	81,825	79,150	69,587	67,741
Windmills .. .. .	65,586	64,008	79,771	78,500
Timber and Wood (unmanufactured)	825,280	847,942	980,833	929,755
	2,523,661	2,496,787	2,858,442	2,762,967

## APPENDIX XXIV.

Statement showing Value and Quantities of the Chief Exports of Agricultural Produce Oversea from the Union of South Africa during the years 1912 and 1913.

Produce or Article.	1912.		1913.	
	Quantity.	Value.	Quantity.	Value.
		£		£
Animals, Living .. ..	—	30,988	—	38,106
Bark (lbs.) .. .. .	118,207,599	283,010	145,717,738	309,329
Buchu Leaves (lbs.) .. .	223,021	38,264	163,812	32,071
Maize (lbs.) .. .. .	192,775,746	443,492	27,641,567	83,678
All other Corn, Grain and Meal (lbs.) .. .. .	38,388,303	121,115	16,556,541	51,607
Ostrich Feathers (lbs.) .. .	999,704	2 609 638	1,023,307	2,953,587
Fruit, Fresh, including Nuts..	—	57,291	—	54,503
Hair Angora (lbs.) .. .	23,479,729	967,286	17,355,882	876,255
Hay and Fodder (lbs.) .. .	18,004,804	44,422	14,311,425	32,513
Hides and Skins .. .. .	—	1,691,042	—	2,017,863
Horns .. .. .	—	14,668	—	16,214
Meats (lbs.) .. .. .	502,336	11,533	198,683	5,858
Sugar, Molasses & Treacle (lbs.)	10,802,610	17,889	12,045,371	18,467
*Tobacco (lbs.) .. .. .	153,475	12,361	244,234	15,579
Tobacconists' Wares (Calashashes) .. .. .	—	27,789	—	9,147
Wines (gallons) .. .. .	61,860	12,723	55,469	11,515
Wool, Sheep (lbs.) .. .. .	161,974,684	4,780,594	176,971,865	5,719,288
	—	11,164,110	—	12,245,580
* Exported to Rhodesia .. .	334,737	58,186	499,224	65,517





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